WHOLESALER'S SALESMAN

CONTENTS — NOVEMBER, 1943

Times and Trends	O. Fred. Rost	9
Business Index—Sales and Inventories		17
Business Index—Regional Analysis		20
News Notes from N.E.W.A.	Alfred Byers	23
Recent WPB Orders and Revisions		25
Free Enterprise—What Is It?	An Editorial by James H. McGraw, Jr.	33
There Are Three Big Markets For Ventilation Equipment	C. W. Dexter	36
With No War Plants to Serve— This Wholesaler Found Plenty of War Service Opportunities	Harrie H. Bierman	40
Things to Know and Watch— In Termination of Government Contracts	Roy Worth	42
What's Ahead In Lighting	Samuel B. Williams	44
A Primer of Electronics	Don. P. Caverly	53
Wholesaler's Salesman News		29 and 69
New Products to Sell		80

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McGRAW-HILL PUBLISHING COMPANY, INC.
PUBLICATION OFFICE, 99-129 NORTH BROADWAY, ALBANY 1, N. Y.
EDITORIAL AND EXECUTIVE OFFICES, 330 WEST 42 ST., NEW YORK 18, N. Y.

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WHOLSALER'S SALESMAN (formerly Electrical Wholesaling) November, 1943. (Vol. 24, No. 11). Published monthly, price 25c a copy. **Return postage guaranteed.** Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, Wholesaler's Salesman, 330 West 42nd Street, New York 18, N. Y. Subscription rates—United States, U. S. Possessions and Latin American Republics, $1.00 for one year, $2.00 for three years. Canada, $1.50 for one year, $2.50 for two years, $3.00 for three years. All other countries, $2.00 or 12 shillings for one year, $3.00 or 18 shillings for two years, $4.00 or 24 shillings for three years. Entered as Second Class Matter, August 22, 1936, at Post Office, Albany, N. Y., under the Act of March 3, 1879. Cable Address: "McGraw-Hill, New York." Member of A.B.P. Member of A.B.C.

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Director of Circulation:
Please change my address on WHOLESALER'S SALESMAN

From .....

.....

To .....

.....

Signed .....

AID *to war production . . .*

Better lighting begins with better wiring. Motion economy and working efficiency begin with provision of electric power outlets at point of use. WIREMOLD Industrial System-Wiring methods and materials have provided these two production necessities for busy war plants throughout the country and in addition have helped solve many special wiring problems contributing to maintenance of war production quotas.

AID *to future planning . . .*

Wiremold Engineers . . . and Wiremold Contractors and users . . . are accumulating a wealth of ideas in application that will help industry save time and money in re-converting to civilian production. For example, basic Wiremold installations made now, or written into specifications for post-war projects provide the flexibility essential to take full advantage of future far-reaching developments in lighting, and in the greatly expanded future use of electrical conveniences in every department of industry, office, farm and home.

PLUGMOLD

simplifies lighting modernization

In the fluorescent lighting installation illustrated above, the advantages of #2100 PLUGMOLD for use in connection with lighting modernization are readily apparent. Note that, by the use of rigid coupling #2101 and a hanger clamp, sufficient rigidity is assured to span beams and also to furnish support for the lighting units. Note, too, that Wiremold Polarized Outlets #2127P permit plugging in of the individual lighting units so that they may be quickly removed for efficient maintenance. The 3-pole receptacles also permit a satisfactory ground. A particularly important feature of this installation is that the Plugmold itself provides a complete electrical distribution system, while the speed and simplicity of installation by Wiremold methods made lighting modernization of this entire factory area possible without interrupting production.

Keep abreast of what Wiremold can do for you today and its potentialities for tomorrow. Be sure your name is on our list to receive new bulletins and data sheets now available or to be issued shortly. Conforms to Federal specifications W-R-32. Listed by U.L. Immediately available on suitable priority.

The Wiremold Company
Hartford 10, Conn.

WIREMOLD CAN HELP YOU
PRODUCE FOR *WAR* . . AND PLAN FOR *PEACE*

TIMES and TRENDS

Contracts And Dumping The war is by no means over in fact the toughest fighting is still to come but now is none too soon to think and talk about such problems as contract termination and surplus stocks.

It is estimated that some 250,000 prime contracts, millions of sub-contracts, $75,000,000,000 worth of orders will be involved. Meanwhile, as of September 1st, 1943 the War Department already had handled about 7,500 termination claims; face value $5,000,000,000, had settled 5,500 of them, indicating that for many the contract termination problem is with us right now.

The same thing can be said about the surplus stocks problem. Already certain agencies heading up this or that activity on particular sectors of the home front have sold standard products at a fraction of their normal wholesale cost. It is estimated that approximately $50,000,000,000 worth of surplus war commodities will have to be disposed of eventually.

To get procedures on surplus goods disposal standardized, is the objective of many efforts now being put forth by individual concerns and business organizations. Because of the variations of policies pursued by different government buying agencies, there are many obstacles.

We believe that the chances for gaining adoption of some standardized procedure would be greatly increased, if all efforts in that direction were rallied behind one single proposal.

In that belief we suggest that the electrical industry study the plan which the National Automobile Dealers Association presented recently to the Small Business Committee of the House of Representatives in Washington.

Here is the substance of it:

1—The distribution of surplus war commodities should be directed by a committee created by Congress of appropriate size, of which one-half of the members should be selected from government and the other half from business.

2—An inventory of surplus war commodities should be prepared as soon as possible and kept current throughout the duration of the war.

3—Immediately upon the termination of the war, all government owned surplus war commodities should be frozen with the exception of perishables, agricultural products and foodstuffs.

4—Distribution of surplus war materials should be governed by the following considerations:

(a) The distribution should be at a rate which would not unduly disrupt trade.

(b) Goods should be distributed at a price low enough to make goods move and high enough to recover a fair return for the government in order to reduce the national debt.

(c) Distribution should be solely through proper trade channels. Acquisition of an abnormally large supply for speculative purposes should be avoided, probably through some governmentally directed inventory control. It is not contemplated that the commodity manufacturer should be prevented from buying, but the price to the manufacturer should be made the same as to a retailer.

(d) Prices of commodities sold by the government should be as uniform as possible.

(e) The right of the government to dispose of surplus commodities to any federal agencies should be acknowledged. It is the intention that gifts or sales outside of the federal government and the usual trade channels should be prevented.

(f) Re-imported surplus war goods should be sold through regular channels and at the same price that surplus war goods in this country are sold by the government.

★

Cover Man Ever since voluntary enlistment or the draft has taken men from the staffs of electrical wholesalers, we have looked for some really dramatic photograph or snapshot of one of those ex-wholesalers—in uniform, or at some battle front, or being presented with some citation. The idea being that such a picture, if of the required artistic and dramatic qualities, could be carried on the cover, sort of as a symbol of ALL THE MEN NOW SERVING WITH OUR ARMED FORCES, who previously were active in the electrical business.

The wished-for picture arrived, with a letter from N. W. Graham, Graham-Reynolds Electric Company,

(Continued on page 13)

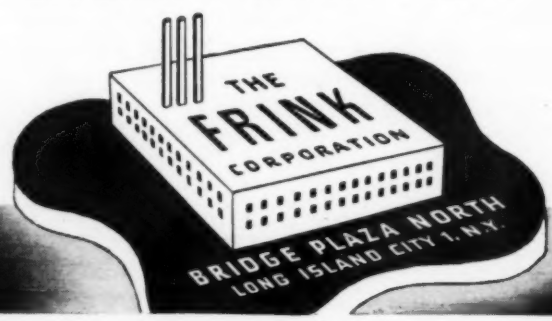
Their *FRINK-SHEATHED SUPERCHARGERS* are the answer, Fritz!

Newest fighter planes of the U. S. Army Air Forces are equipped with turbo-superchargers that enable them to outclimb Axis planes in combat. Attacking their adversaries from above, our pilots have the advantage that often means the difference between victory and defeat.

A vital part for these all-important superchargers is made by The Frink Corporation. The name Frink, though a relatively new name in the aircraft field, is an old and familiar one in the lighting industry. For 86 years Frink has meant expert engineering of lighting installations and precision manufacturing of lighting equipment. A pioneer in Fluorescent illumination, The Frink Corporation developed LINOLITE, the famous "engineered for vision" Fluorescent equipment, installations of which are giving such efficient and profitable service in many of America's foremost factories, stores and banks.

Today Frink, together with other leading manufacturers, is heavily engaged in making implements of war. Tomorrow Frink will resume the high quality engineering and manufacturing of lighting equipment which have gained an enviable reputation for its products in the lighting industry.

"LIGHTING SINCE 1857"



Subsidiaries: Sterling Bronze Company, Inc.
Barkon-Frink Tube Lighting Corporation

(Continued from page 9)

Los Angeles, California. It shows Kenneth N. Graham of that firm, on guard duty somewhere in Iceland. An intensely interesting "V" Mail letter was enclosed also but could not be cleared through censorship in time for use in this issue.

Meanwhile, we thank Mr. N. W. Graham for sending us this picture and we hope that Kenneth N. Graham will not be too severely shocked to find his picture on the cover, when, where and as a copy of the November 1943 issue of WHOLESALER'S SALESMAN catches up with him.

★

Help Hold the Line From Washington, Fred M. Vinson, Director of Economic Stabilization reports that prices rose only 12 percent during the first 19 months of World War II as compared with a rise of 29.5 percent in the corresponding period of World War I. That's a record to be proud of, but the battle is still far from won. In fact on the price-front, just as on our far flung battle fronts, the worst is yet to come.

However, those figures prove, that inflation can be averted through measures now in effect or planned. Therefore, if every man, woman and child will cooperate with the Government in this particular effort—no matter how much it hurts—we are going to come through without suffering the disastrous effects of real inflation. Help hold the line.

★

What Price, Price Control? Well you know your own case best but here is the report of a wholesaler handing over a check for $35,000 to the OPA as a compromise settlement for having charged over-the-ceiling prices on a flock of radio sets.

Originally the OPA claimed that over-charges totaled $46,000, also moved for triple damages, permitted under the law. So the wholesaler might have had to pay $138,000, if after an audit of his books no compromise had been reached because willingness to pay $35,000 would seem equivalent to a confession of guilt.

Point is, that war-time rules and restrictions had better be taken seriously while they exist. When conditions warrant, let's get the lids lifted just as quickly as possible.

★

Lighting vs. Absenteeism Two sets of recently published figures caught our eye—The National Industrial Conference Board estimates that during the month of May 1943 alone our war production effort lost 41,500,000 man-DAYS due to absenteeism, and nearly half of the absences, over 20,000,000 man-DAYS were lost for purely PERSONAL REASONS.

An equally reliable source estimates that through getting good lighting installed in war plants the electrical industry has been adding production efficiency at the rate of 200,000,000 man-HOURS per year to our war-effort. That's equal to 25,000,000 eight hour man-DAYS.

These figures mean that those war workers who wilfully deserted their war jobs and lost over 20,000,000 days, almost dissipated in a single month all the benefits that have accrued to our war production effort in a whole year—12 months—from better lighting—a deplorable condition to say the least.

We wonder how long it would be before Nazis would overrun our Atlantic states and the Japs would control our Pacific states, if the boys at the fighting front lost over 20,000,000 man-DAYS in a single month, "for personal reasons."

★

Aid to Small Plants On November 1, a new loan system became available to small business concerns engaged in the production of war material or essential civilian requirements.

The Regional Loan Agents of the Smaller War Plants Corporation will have authority to make loans up to $25,000 without consulting Washington, will enter into repurchase agreements up to 100 percent with banks on such loans, where banks agree to close and service the loans.

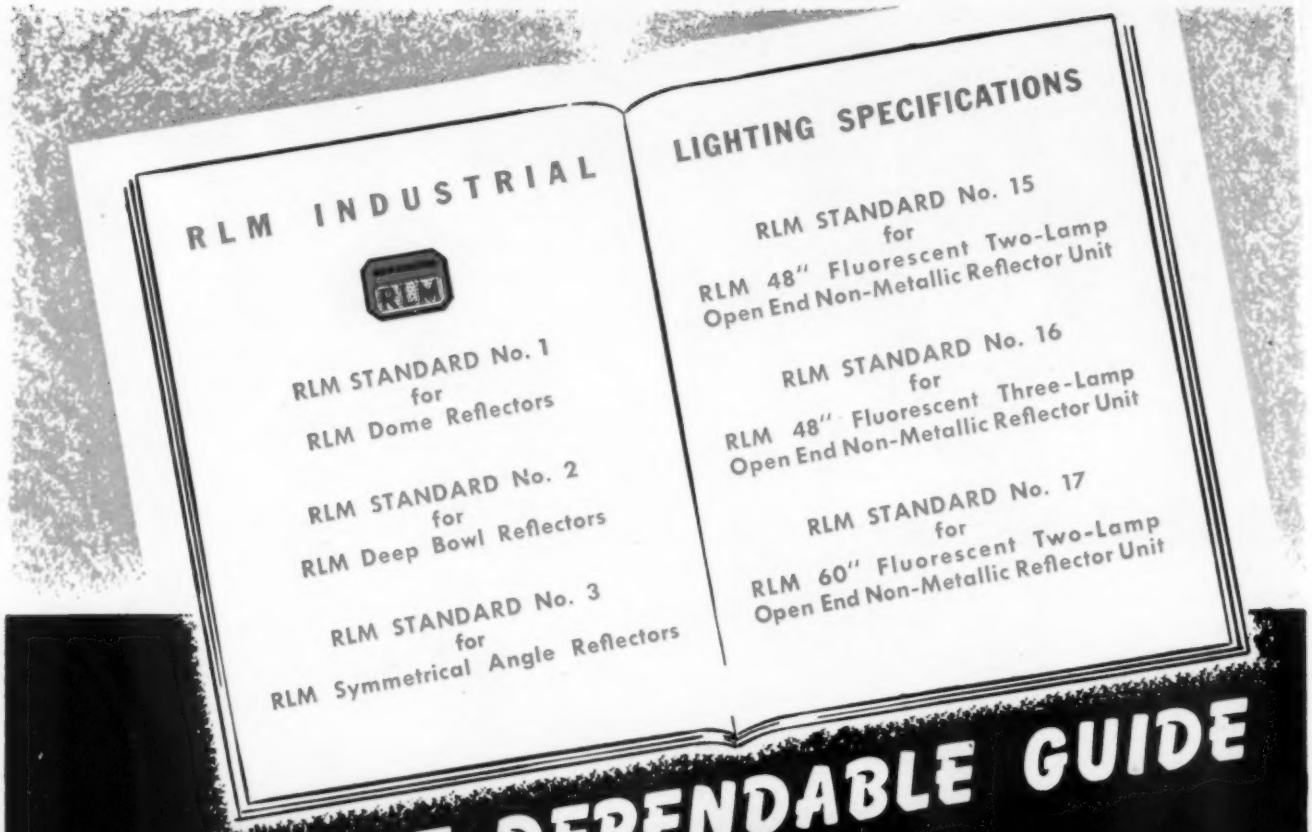
One more thing taken out of Washington.

★

Price 23 Cents That's the price of a full-course dinner including roast beef with yorkshire pudding, or steak and kidney pie, or roast pork, or corned beef, or salmon. Then there is a choice of: soups, potatoes, vegetables, two kinds of puddings, tea or coffee.

Where? . . . . . According to *Factory*, McGraw-Hill Industrial Magazine, there are some 2,000 eating places in Britain, operated by British Restaurants, where those meals are offered for One Shilling, equal to about 20-23 cents of Uncle Sam's money.

EDITOR



THE MOST DEPENDABLE GUIDE TO EFFICIENT AND EFFECTIVE INDUSTRIAL *Lighting*

The RLM Label Has Stood As A Sign of Quality in Industrial Lighting Reflectors for More Than 20 Years.

● The RLM Standards Institute does not manufacture lighting equipment. It is a non-profit organization operated to develop and promulgate standard specifications for the efficient performance of industrial lighting equipment.

When you buy industrial lighting fixtures, the RLM Official Standard Specifications listed above provide a dependable guide on vital construction and performance factors. You can be sure that fixtures built to these specifications will deliver the engineered lighting so essential to maximum output of war products...will help available workers do more and better work . . . will provide sustained lighting efficiency with minimum cost for power and maintenance.

All industrial lighting units certified by RLM Institute to conform to RLM Standard Specifications are identified by the RLM LABEL. This label on a lighting unit is your assurance that it has been manufactured in compliance with RLM Specifications under the exacting and continuous inspection procedure provided by Electrical Laboratories.

Copies of RLM Specifications are available through manufacturers utilizing RLM inspection and certification service, or direct from RLM Standards Institute.

The letters RLM Stand for Reflector and Lighting Equipment Manufacturers

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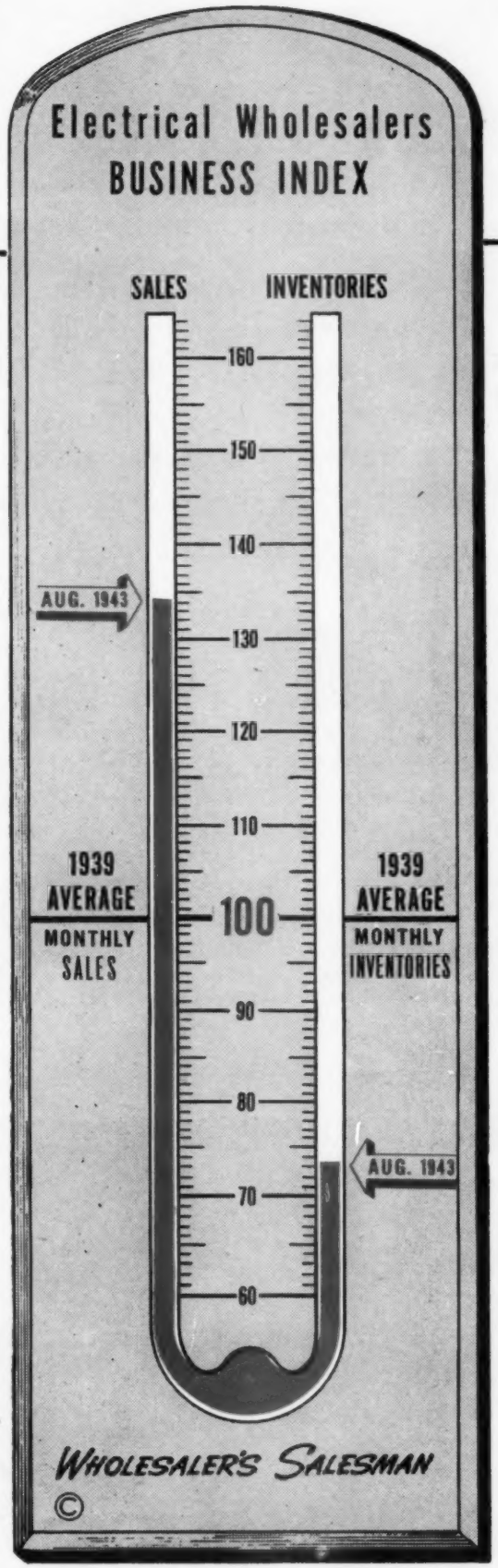


SOURCE The figures we use as basis for these monthly comparisons of performance in the electrical wholesaling field are collected and compiled by the Bureau of the Census of the U. S. Department of Commerce.

Business Index
For the Month of August, 1943

SALES The sales of electrical goods by wholesalers throughout the country in August, reached 134 percent of the 1939 average monthly sales volume. This was a gain of 6 points over the percentage of sales registered in July.

This increase comes after somewhat of a slump experienced in June and July, which was considered to have been caused by seasonal factors, plus the generally-reported slow-downs in demands for electrical goods in war production. And it may well mean that the sales volume of electrical wholesalers is going to trend toward higher levels such as were reported during the Fall and Winter months of 1942-43.

Although no general relaxation of WPB restrictions is anticipated for some time, the possibility of a sizeable increase in wholesaler's sales through more activity in the consumer or non-rated market can not be entirely disregarded. The commonly-accepted idea is that war demands for certain "critical" metals are being met in good order and that production plants are set up to produce specific items in whatever quantities are needed for the "big push." Yet, not all our capacity in aluminum and magnesium, for instance, is needed for war, so that by Spring or Summer of 1944, some of these metals may go into appliances. Wholesalers then should begin to feel such sales-boosting volume in addition to a steady demand for repair, maintenance and operating supplies from industry.

INVENTORIES A slight but welcome upward swing in the volume of inventories of electrical goods was reported for August by wholesalers. Average stocks were 73 percent of the 1939 base of monthly inventories which represents a period when there was neither a shortage of goods nor any limitation on how big a stock a wholesaler might carry.

COLLECTIONS Collections throughout the country were reported at an average of 77 percent. This was 6 points above the percentage for the same month of 1942, and 2 points above the revised figure for the preceding month. Accounts receivable averaged 4 percent less than for July and 30 percent less than for August, 1942.

"So men may li

Crash landings at sea used to mean "curtains." Now, more and more of our fliers come back . . . thanks to modern life rafts. Today's improved *"See-ability"* is helping workmen build them faster — and better . . .

Let's suppose you're flying a patrol and run out of gas far at sea. Your engine sputters, dies and—down you come.

A tough spot . . . but almost before your ship hits the water you're clear and aboard the rubber raft stowed away for just such emergencies.

Rugged, sea-worthy, these amazing boats have kept fliers and their crews afloat for weeks! No wonder they can take it—when you realize how carefully they are built; how rigidly materials and workmanship are tested and re-tested!

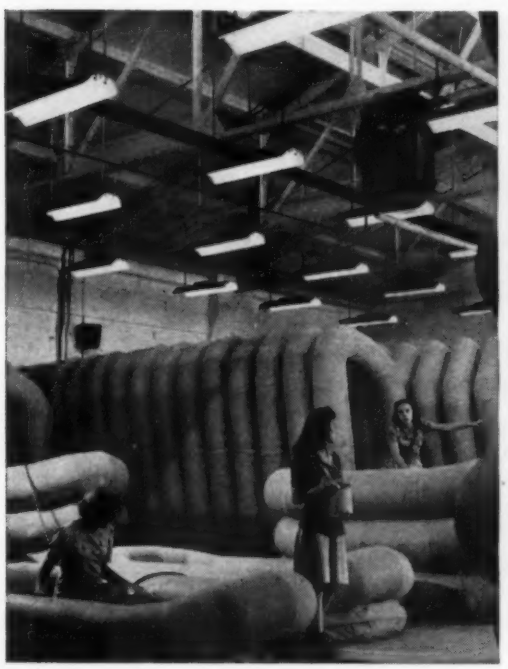
On this life-and-death job "See-ability" through modern improved lighting is playing an important role. It is helping eyes and fingers do their work faster, more efficiently. It is speeding production—reducing "rejects," increasing quality.

In fact, in this as well as other vital war work, millions of Westinghouse Mazda Lamps are bringing better "See-ability," helping set new peacetime lighting standards for the industrial world of tomorrow.

Recommend Westinghouse Mazda Lamps to your customers who are on war work. Today's lamps are brighter, longer-lasting, lower-cost than ever before! Westinghouse Electric and Manufacturing Company, Bloomfield, N. J. *Plants in 25 cities...offices everywhere.*

Easy on the eyes (*opposite page*) . . . Looking for broken threads in boat fabric. Here the operator must look directly into the light. How significant that Westinghouse Mazda Fluorescent Lamps were chosen for this critical task!

KEEP YOUR DOLLARS FIGHTING . . . BUY WAR BONDS



live to fight again!"

Westinghouse

MAZDA LAMPS

FOR BETTER "SEE-ABILITY"

WHOLESALER'S SALESMAN BUSINESS INDEX

REGIONAL ANALYSIS

AUGUST, 1943

SALES of electrical goods in August, as compared to July, were not evenly balanced throughout the nine regions, although all but one group of states showed sales above the previous month.

Five of the regions registered sales volumes above or equal to the national figure, with three of these reporting gains from 11 to 21 points above the average for the country.

Two of these three regions, Nos. 7 and 8, were among those discussed last month because of their relatively poor regional performance. Number 7, for example, has been running behind the national figure for four months. The August report is the first one since April in which these states (Ark., La., Okla., Texas) have reported sales equal to or above the sales for the previous month.

Region 3 presents a problem for analysis. Reports from those states (Ohio, Indiana, Illinois, Michigan and Wisconsin) have shown sales volume to be less than 100 percent of the previous month each month since April. One explanation is that until this Spring that region was working on some very large war construction projects which were added to the already completed conversion of the automobile and electric appliance industries, new additions to the manufacturing and raw materials industries, as well as its share of arsenals, Army and Navy establishments, and airbases. Completion of this work, and a resultant lessening in the demand for electrical goods of every nature, now is reflected each month in the declining sales volume reported from that region.

Figures in this table apply to the geographic divisions as outlined and numbered in red ink on map above

SALES AUGUST, 1943 Compared in % with		Trading Region (See Map)	INVENTORIES AUGUST, 1943 Compared in % with	
July 1943	August 1942		July 1943	August 1942
100	104	1	98	53
101	78	2	96	53
99	69	3	93	55
104	71	4	98	52
103	69	5	98	63
118	65	6	90	56
115	72	7	97	46
124	73	8	97	65
109	87	9	102	71
104	**77**	For **U. S. A.**	**97**	**58**

Deliveries of electrical goods to wholesalers throughout the country in August resulted in fairly well balanced inventory reports from the nine regions. As compared to the inventories reported for July, only one, region 6, with a report of 90 percent, varied far from the national figure of 97 percent.

News Notes From N.E.W.A.

By Alfred Byers, *Secretary*
National Electrical Wholesalers Association

ELECTRICAL APPLIANCE DISTRIBUTORS

During the past month considerable attention has been given to activities and services for N.E.W.A. members functioning as electrical appliance or electronic distributors. Headquarters has developed much helpful information for use in connection with the campaign to interest such non-member distributors in membership.

The opening announcement of this effort appeared on page 47 of this magazine last month in the form of an N.E.W.A. "Invitation" to electrical appliance distributors. This campaign, now in its developing stage, gives every promise of proving successful. Mr. Pyle, N.E.W.A.'s managing director, has received an enthusiastic response from the membership at large.

Inquiries in the field disclose a real need for a central rallying point for this type of distributor, however, one serious handicap to gaining the greatest possible response to the N.E.W.A. campaign at present, is the lack of merchandise in the appliance field. Though these distributors have practically nothing electrical to sell at the moment, they are managing, by their business ingenuity, to survive. They are post-war minded and the Association is discovering in day to day talks that these distributors are entirely aware of the help they will need and can expect in their appliance operations post-war.

Progress in this membership effort by the Association may necessarily be slower in developing than is desired. Nevertheless, most recent contacts out in the field, portend quite satisfactory progress once momentum has been gathered.

POST-WAR PLANNING

Quite naturally, N.E.W.A.'s post-war planning is closely related to the appliance field. More and more as the committee meets, it is apparent that the industry is in for some great activity in appliance merchandising post-war. Just as noticeable too is the fact that new and serious problems will accompany it. The committee is compiling considerable useful data in both regards.

This past month the Appliance Sub-Committee has been particularly active in developing some of these data in concrete form. For one thing, a specific program of post-war subjects has been formulated. Individually, the members of the sub-committee, under Chairman E. B. Ingraham's direction, have compiled excellent factual material.

Several releases are ready for distribution to N.E.W.A.'s membership. More are forthcoming. The membership already is receiving some of these releases which contain really constructive data for their own individual guidance in adopting their operations to post-war conditions as they are now shaping up.

WAR WORK AT HOME AND AT WASHINGTON

Important as they are, post-war plans by no means consume the full time of N.E.W.A. Cooperation with the war effort is not forgotten, nor is it being neglected. It is still the outstanding N.E.W.A. activity.

N.E.W.A. headquarters continues to devote much time to the publication of its information bulletins on governmental regulations and orders. Members' individual inquiries on a variety of war-time problems remain a daily concern of headquarters. During the past month several important matters were given attention with benefit alike to member and non-member.

Mr. Pyle's days in Washington have been long ones and busy ones. His calling list there grows with each passing month. The matters he is called on to discuss have industry-wide effects. His most recent conferences in Washington, Mr. Pyle reports, indicate that the overall war control program is pretty well set.

N.E.W.A.'S EXECUTIVE COMMITTEE HOLDS TWO DAY SESSION

The executive committee of N.E.W.A. held a meeting at New York on October 26th and 27th, 1943. Members of the management committee attended, as did several Washington officials by invitation.

Important Association matters were considered and will be reported to the entire membership as usual. Problems connected with the industry's participation in the war program also were discussed with the government's representatives from Washington.

SECRETARY'S TRIP

A ten day's trip through parts of Kentucky, Tennessee and West Virginia was made recently by this reporter. This trip covered territory in which no N.E.W.A. representative had been for some years. We called on and met a number of distributors in both the supply and appliance fields. N.E.W.A. was found to be well known in that area, and it is expected that more members will be added to the roster.

Curtis . . .
A NAME WHICH
TWO GENERATIONS
HAVE FOUND
Reliable . . .
. . . and

A REFLECTOR
TO WHICH THE
CONTRACTOR CAN
TRUST HIS REPUTATION

In these days it's good to know that the staunch old line manufacturers are still behind you . . . continuing to produce merchandise upon which you can stake your reputation!

Take for instance Curtis "X-Ray" Silver Mirror Reflectors . . . they earned their reputation for dependability and performance over the years gone by . . . and still today there's nothing on the market that can touch them for controlled light delivery. Many sizes and types are available.

The No. 589-T illustrated at right is a relatively new member of the "X-Ray" family—but it has already proved itself on scores of big industrial jobs. Specification sheet 2132 gives full details as to sizes, wattages and construction advantages.

Write for your copy today!

X-Ray
TRADE MARK REG.

SILVER
MIRROR
REFLECTOR
for
INDUSTRIAL LIGHTING

CURTIS Lighting, INC.
6135 WEST 65TH STREET, CHICAGO 38, ILLINOIS

Recent WPB Orders and Revisions

Construction and Maintenance Now in New WPB Section

A new section of WPB's Wholesale and Retail Trade Division has been established which will be the focal point for all matters pertaining to maintenance, repairs, supplies, equipment and construction necessary to the operating facilities of the distributor.

To be known as the Maintenance and Construction Section of the Wholesale and Retail Trade Division, the new Section was formerly the Retail and Wholesale Trade Section of the Service Equipment Division.

This Section, which is designed to cover the needs of the wholesaler's own facilities, is mentioned as a completely different organization than that headed by Julian Hawks (the Electrical Supplies Section) which is concerned with the needs of the wholesaler's customers.

If a wholesaler wishes to make any changes or repairs in his establishment due to his desire to market a different type of merchandise than previously, and one which requires new maintenance equipment, and he can not get this work done locally, he can apply to the new section in Washington for consideration of his problem.

Copper—Excess Stocks Available to Warehouses

Frozen, idle and excess inventories of copper wire and cable were made available to copper wire mill warehouses on September 11th when the Copper Recovery Corporation sent to these warehouses a list of the available stocks, plus a letter which follows:

"The War Production Board is endeavoring to move frozen, idle and excessive stocks of copper wire and cable into active and useful channels. A catalog showing this material is enclosed.

"The copper wire mill warehouse purchasing this material agrees to the following conditions:

"'Deliveries shall be made only in accordance with CMP Regulation No. 4, as amended July 17, 1943, and must be reported to the War Production Board, on report from WPB-3009. Deliveries so made and reported may be used to substantiate a warehouse stock replacement order on a producer or other warehouse.'

"Requests may be made in accordance with the instructions in the catalog.

"As a result of the mailing of this catalog we may have occasion to refer others to you for cable or wire that you may have reported as frozen, idle or excessive on Form WPB-2019.

"The success of this program is contingent on the accuracy of our records, and you are urged to fill out the attached deletion slip if you have reported any inventory to us which you now wish to retain or that has been disposed of since you originally filed your report. We strongly urge you to keep us constantly advised on further disposition of reported material in order that we may maintain at all times accurate inventory records."

Copper Order Revised

Under the date of August 24, the War Production Board revised Supplementary Order M-9-b to include the following changes.

Definition No. 4 now reads—"'Copper Base Alloy' means any alloy, except one which contains 0.01 percent or more of metallic beryllium, in the composition of which the percentage of copper metal by weight equals or exceeds 40 percent of the total weight of the alloy."

Under paragraph (b) which forbids the delivery or acceptance of any scrap, copper clad steel scrap or alloy ingots except in accordance with certain directions, states that one of these directions (3) will now read: "Copper clad steel scrap and unreloadable fired artillery cases or bullet jackets, which have been manufactured from copper, copper-base alloys or copper clad steel, in excess of ten pounds, shall be delivered only to persons specifically authorized or directed by the War Production Board to receive such deliveries."

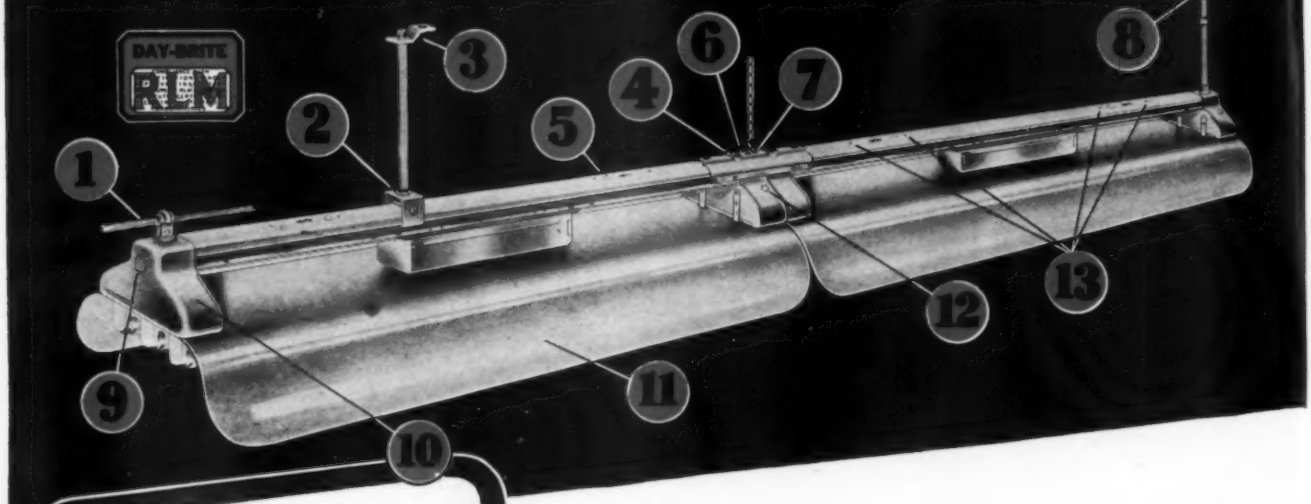
And that: "No person shall accept delivery of alloy ingots, copper clad steel scrap or unreloadable fired artillery cases or bullet jackets, which have been manufactured from copper, copper-base alloys or copper clad steel, in excess of ten pounds, except as specifically authorized by the War Production Board."

Copper Wire For Retailers, etc.—CMP-9

Methods by which retailers, radio repair shops, and electricians get copper wire for resale or for household, farm and small commercial repairs and improvements, were described by the War Production Board in CMP Regulation No. 9, issued on September 7.

The following subjects are covered in the regulation: what retailers can buy copper wire under this regulation; what repairmen can buy copper wire under this regulation; what copper wire is covered; how retailers and repairmen can buy copper wire; how much copper wire

The DAY-LINE... For Single Unit or Continuous Installations



1 ½" K.O. for cable clamp installation direct to fixture.
2 Slide channel clamps for rod or pipe hangers can be located at any point on channel.
3 Swivel type hanger strap is adjustable for pipe or rod alignment.
4 K.O.'s for pipe.
5 K.O. for cord.
6 Rigid one-piece coupling converts, single units to continuous fixtures.
7 Chain hanger slots in top of channel and in center of coupling.
8 Complete pipe hangers with ceiling canopy and all fittings.
9 K.O. in end for through feed.
10 Rigid, one-piece, die-formed end boxes welded to channel assure rigidity and proper alignment of all parts.
11 Non-metallic reflectors (RLM and U. S. Bureau of Standards approved). Reflection factor, 85% or more. Angle of cutoff, 14°.
12 K.O. for switch.
13 Screw holes for direct surface mounting. No couplings needed.

13 POINTS OF FLUORESCENT LIGHTING SUPERIORITY

In this new Day-Line Industrial Fluorescent Fixture, thirteen superior features give you the ultimate in lighting—now and from now on! Day-Brite's "Super-White" baked enamel finish on non-metallic reflectors assures continuously high illumination efficiency. Unusual mechanical, installation and maintenance features are illustrated above and briefly described in the panel at the left.

The same basic Day-Line Fixtures are supplied for single unit mounting or continuous runs for 2-40 Watt, 3-40 Watt and 2-100 Watt lamps. Send for helpful dimensional, specificational, and illumination data contained in Bulletin F-69.

DAY-BRITE LIGHTING, INCORPORATED
5426 Bulwer Ave. — Saint Louis, Missouri

DAYBRITE
The Sign of Quality
Look for this Label

Day Brite
LIGHTING FIXTURES

71

COMMERCIAL · INDUSTRIAL and SPECIAL DESIGNS *Nationally distributed through all leading electrical supply houses*

may be bought; retailers may sell copper wire free of ratings; restrictions on use of wire by repairmen; restrictions on inventory; compliance with Conservation Order M-9-c; and appeals to local WPB offices.

Regarding the issuance of this regulation, the following comment was received from E. M. Maynard, chief, warehouse section, wire mill branch, copper division, WPB:

"Deliveries of wire and cable made by Copper Wire Mill Warehouses, on properly certified CMP No. 9 orders, should be reported to the War Production Board on report from WPB-3009 as program symbol 'V-3'.

"All inquiries which retail dealers, repairmen or electricians may have regarding this regulation, should be directed to their nearest War Production Board office."

Secondary Electric Devices Controlled by L-315

A new WPB general limitation order, L-315, was issued on the 16th of September because of "a shortage in the supply of materials used in the production of enclosed safety switches, enclosed branch and service circuit breakers, service entrance equipment, panel and distribution boards, and knife switches for defense, for private account and for export . . ."

The order provides that: "After September 26, 1943, no producer or dealer shall accept an order for any secondary electrical distribution equipment or enclosures unless the order or delivery bears a preference rating of AA-5 or higher.

"After December 16, 1943, no producer shall put into process any material for the manufacture of secondary electrical distribution equipment or enclosures, or parts thereof, except in accordance with the restrictions contained in schedule A of this order," but that "the provisions (of the above order) shall not apply to the manufacture of any device for direct use by the Army, Navy, Maritime Commission or War Shipping Administration, where such equipment is required for shipboard use, or to the manufacture of any device or item or equipment for direct use on aircraft."

Included in the terms of the order was secondary electrical distribution equipment, rated at not over 600 volts, such as:

Enclosed safety switches rated from 30 amperes to 2400 amperes; enclosed branch or service circuit breakers, rated under 600 volts, in which all current carrying parts except the terminals are completely enclosed by an insulating case; service entrance equipment; those panel and distribution boards accessible from the front and designed to be supported in or against a wall; knife switches rated from 30 amperes to 1200 amperes inclusive.

Some Civilian Goods Allowed By WPB Order

In order to safeguard production of civilian goods from military demands, the War Production Board recently announced an open form of directive "designating a portion of the production of specified items for distribution through regular distribution channels to civilian consumers.

Although but a few electrical goods were included on the list issued, it is believed that the issuance of this order is evidence of the desire of WPB to provide essential civilian goods to the extent possible under present stepped-up military requirements.

The use of an open type of directive gives the WPB an opportunity to add more products to the list as the situation changes.

The directive states that manufacturers may not disregard preference ratings or WPB orders, but if such ratings "prevent you from shipping the specified percentage (of civilian goods) you are to notify the War Production Board immediately. The board will then either permit you to disregard ratings and WPB orders or regulations to the extent necessary, or make whatever adjustments it considers appropriate."

Record Procedure—CMP-5

From Mr. J. Joseph Whelan, recording secretary of the War Production Board, has been issued the following direction pursuant to CMP Regulation No. 5:

"(a) Each person who is subject to the quantity limitations of paragraph (f) of CMP Regulation No. 5 (Section 3175.5) must compute his quota and must keep his computation and supporting work sheets in his files for two years after his last purchase under the regulation. He must also maintain a record of his expenditures for maintenance, repair and operating supplies for a period of not less than two years.

"(b) In computing the quota, and in charging purchases against the quota, a person is required by paragraph (f) to include all material purchased for maintenance, repair and operating supplies whether the rating and allotment symbol assigned by the regulation is used or not. However, a person may, at his option, exclude the cost of his labor, or the cost of any item in list A or B of Priorities Regulation No. 3, as long as he excludes such costs from both the computation of the quota and from the charges against the quota."

Used Washing Machines Classified by OPA

In a move designed to hold prices for used domestic washing machines in line with the general price level, the Office of Price Administration has issued Maximum Price Regulation Number 372, which sets ceiling prices for these machines.

The new ceiling prices were set up according to classifications based on function, capacity and quality features of the various types of machines in use. Consideration was also given to durability, efficiency, flexibility and safety.

A complete list of specifications for each class is available from local OPA offices. It is contained in a copy of Maximum Price Regulation Number 372.

Wholesalers May File For Flashlight Battery Quotas

A memo from the WPB advises that on and after October 1st, wholesalers may file for fourth quarter requirements of flashlight batteries. The distribution of the third quarter allotment on WPB-547 (PD-1X) was reported to have been completed early in September.

(Continued on page 66)

Here are the NEW

certified FLEUR-O-LIERS

...with more to come

GRUBER
ENDER
CURTIS
SUN-LITE
WAKEFIELD
LEADER
TRU-AD
LIGHT CONTROL
WILEY
A. L. SMITH
ELECTRO
WILLIAMS
MITCHELL
EASTERN
Certified
FLEUR-O-LIER
The Manufacturer guarantees by affixing this label that this Fluorescent Luminaire is a duplicate of samples found by periodic examination to comply with the minimum requirements as set up in the
"SPECIFICATIONS FOR LUMINAIRES, FITTINGS AND AUXILIARIES FOR FLUORESCENT LAMPS"
which are sponsored by the Manufacturers of Mazda Lamps.
Electrical Testing Laboratories, Inc.
NEW YORK, N. Y.
A COPY OF THIS CERTIFICATE SHOULD APPEAR UPON EACH UNIT OR PACKAGE
E.T.L.
E.T.L.
When you specify fluorescent lighting fixtures, get the protection this label gives.

Shown here are some of the TESTED, CERTIFIED, GUARANTEED FLEUR-O-LIERS. Models of other FLEUR-O-LIER Manufacturers are now in the testing laboratories and will be released shortly.

Many sources of supply... and extra protection for YOU!

The big idea back of FLEUR-O-LIER is protection *for you.* It's a practical, helpful program that has already served scores of war plants. Many leading fluorescent fixture makers participate.

The Fleur-O-Lier *label* on a unit tells you at a glance that this product was *Tested* by impartial, independent Electrical Testing Laboratories, Inc., New York; *Certified* by them as meeting 50 definite standards set up by Mazda lamp manufacturers; and checked again at the factory four times a year by E. T. L.

Fleur-O-Lier standards cover all important features for good lighting *performance* and *service* as well as WPB and Bureau of Standards requirements. And you get many PLUS features provided by individual makers.

Wherever you're located, there's a Fleur-O-Lier Manufacturer not far away. Leading jobbers sell Fleur-O-Liers. You can get Fleur-O-Liers on suitable WPB priorities.

Important for warplant offices and drafting rooms!

The August 18th amendment to L-78 removes the restriction against *manufacture* of "non-industrial" fixtures *after* December 1st, 1943. Consequently, FLEUR-O-LIER Manufacturers will make and supply "commercial" FLEUR-O-LIERS for warplant offices and drafting rooms. Sold on A-1-j, or higher, ratings . . . and complying with all WPB limitations on use of critical materials.

For further information, together with new booklet of FLEUR-O-LIER specifications and list of makers, write to FLEUR-O-LIER MANUFACTURERS, 2121-11 Keith Building, Cleveland 15, Ohio.

FLEUR-O-LIER

CERTIFIED FIXTURES FOR FLUORESCENT LIGHTING

Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements

WHOLESALER'S SALESMAN NEWS

Increase in Plans For Post-War Buying

A nationwide survey by the Chamber of Commerce of the United States reports that post-war buying intentions of the nation's families are increasing almost daily and present indications are that post-war purchases will be far in excess of the billions of dollars that were in prospect when a previous survey was made last winter.

Of particular interest to electrical wholesalers and their salesmen are these trends:

The household appliance field shows an increase in buying intentions from $860,185,000 to $1,215,910,000, with the greatest jump occurring in radios and electric mixers.

1,540,000 families—an increase of 50 percent—intend to build or buy a new home within six months after the war is over. The prospective investment has risen from an estimated $5,000,000,000 to $7,184,800,000.

REA Allotments Of $1,599,678

Loan allotments of $1,599,678 to twenty-two rural electric co-operatives in fourteen states have been announced by the Rural Electrification Administration.

Funds borrowed under these allotments will be used to finance facilities already completed in accordance with War Production Board regulations; to acquire existing properties which will facilitate electrification of additional farms in the post-war period, and for immediate extension of service to farms qualifying under present WPB regulations permitting connection to nearby rural power lines of farms producing livestock, dairy and poultry products.

No new construction will be undertaken except in accordance with authorization or regulation of the WPB, and in case of allotments involving acquisition of additional properties, the funds alloted for new construction will not be used until after the war.

Revenue Increases

REA borrowers, in their 1942 report made recently to the Rural Electrification Administration, announced that revenues of the systems were approximately $47,000,000—$12,000,000 more than in the previous year.

The report stated that the 1942 consumption of electricity by REA-financed power systems totaled 1,150,000,000 kw.-hr. compared with 724,000,000 kw.-hr. for the year before.

New Owners for Gilson Elec. Supply

Gilson Electrical Supply Co. at 1106 Madison St., Oakland, Calif., has been taken over by William Figroid, Charles Martin and Herbert Dowd. They purchased the interests of Frank Boyd and Walter Vance, who have operated the business since 1939, buying it then from its founder. Figroid has been the manager, having formerly been the purchasing agent for Pacific Electric Motor Co. Martin also has been with the company for some years.

Coincident with the announcement of the new management was one that the company had expanded to take on the

"TOASTMASTER" GETS "E" AWARD. Employees and management of the Toastmaster Products Division of the McGraw Electric Company, Elgin, Illinois, were presented the Army-Navy citation for outstanding production of war materials. At the ceremonies shown above, grouped immediately in back of the banner, are, left to right: Rear Adm. Alex M. Charlton; Max McGraw, president of the company; Commdr. Miles H. Hubbard; D. Scott Campbell, executive vice-president of the company; Murray Ireland, vice-president in charge of manufacturing; Capt. Robert Henderson, USN, who made the presentation; and Lt. Col. A. B. Patton, who presented "E" pins to the eight employees who are in the background.

T&B

LOCK-TITE PRESSURE CONNECTORS

EACH CONNECTOR TAKES SEVERAL CABLE SIZES

T & B Lock-Tite Lugs in 7 sizes take all cables No. 4 to 1,000,000 C.M.

T & B Lock-Tite Tee-Parallel Taps in 6 sizes tap all mains 1/0 to 500,000 C.M. to all branches No. 2 to 500,000 C.M., tee or parallel.

T & B Hinjon Juniors in 12 sizes tap mains No. 8 to 1,000,000 C.M. to all branches No. 14 to No. 1.

T & B Lock-Tite 2 Ways in 7 sizes make all splices No. 4 to 1,000,000 C.M.

ONE THING'S CERTAIN

This blowin' hot for coal an' cold for oil, an' then switchin' around back an' forth is what brings on the headaches.

But here's a hot tip that's goin' to keep burnin' all winter, an' that's your Maintenance an' Repair business—helpin' to keep war-worn electrical wirin' an' equipment in good workin' order—reducin' headaches for everybody.

There's a lot of such equipment on the verge of breakin' down an' crackin' up, just waitin' for you to arrive on the scene in the nick of time with these T & B Pressure Connectors. Here's what the book says about 'em:

> T & B Pressure Connectors are a cinch to install, especially for any maintenance man in a hurry. One piece construction. No loose parts. Sturdy cast construction. Salvageable. No solder.
>
> They take any kind of conductor—solid, stranded, flexible, etc. And each fitting takes a wide range of cable sizes. Tools: Screw driver or hex key wrench.

For complete dope send for Maintenance an' Repair Booklets.

Our sole Distributor under the T & B Plan is the Electrical Wholesaler. He reduces the manufacturer's selling costs, thereby reducing the cost of all electrical material to the user.

Reddy

THE THOMAS & BETTS CO.

INCORPORATED

MANUFACTURERS OF ELECTRICAL FITTINGS SINCE 1899

ELIZABETH 1, NEW JERSEY

In Canada: Thomas & Betts Ltd. Montreal

Walworth line of valves and fittings and water pipe. Dowd has been Oakland branch manager of the Walworth-California Co. The Oakland branch is now closed and Gilson handles this line of pipe and fittings. It is also agent for the Youngstown Sheet & Tube Co. line of water pipe. These additional lines were felt to be consistent with the company's specialization upon industrial type of electrical equipment.

A humorous newspaper was sent to the trade to announce the change.

Copper for Farmers

One million pounds of copper wire for farmstead wiring during the 4th Quarter of 1943 has been made available by the War Food Administration.

It will be distributed among the states on the basis of authorizations made by the county war boards during the third quarter. None of this wire may be used for ordinary home wiring.

Thomas and Betts Gets "E" Star

Receipt of renewal of the Army-Navy "E" production award for a period of six months has been announced by George C. Thomas, Jr., president of the Thomas and Betts Company, Elizabeth, N. J.

This is the third war production award received by this firm. In World War I, Thomas and Betts received War Department recognition for turning out materials for the armed services.

Renewal of "E" and "M" For Edwards & Company

In recognition of continued achievement in production of war material, Edwards and Company of Norwalk, Conn., has been awarded renewals of both the Army-Navy "E" and the Maritime "M."

The chairman of the Navy Board for Production Awards stated in his letter that in meriting a renewal of the "E," the management and employees of Edwards and Company "have indicated their solid determination and ability to support our fighting forces by supplying the equipment which is necessary for ultimate victory."

The chief of the Maritime Commission wrote that the production record

(Continued on page 69)

***PROMOTED.** Howard M. Price, left, for several years manager of the electrical, automotive and sporting goods departments of the Salt Lake Hardware Co., Salt Lake City, has been promoted recently to the position of director of sales for the company. Charles G. Cheney, right, has been appointed to the position vacated by Mr. Price.*

***WORKING HARD** for Graybar in the war-busy Salt Lake City area are R. W. Kimberlain, right, manager, and L. C. Johnson, operating manager.*

***GATHERING** of dealers and service men at the Service School of the General Electric Supply Corp., Salt Lake City on July 15. This was one of the 39 scheduled General Electric Product Service Division schools under the G.E. "T" Plan. H. D. Miller of the General Electric Supply Corp. was in charge of the school. J. A. Kahn, district manager, J. L. Fahey operating manager and W. J. Kern, Product Service supervisor are in this group as was also Jack Dreyfuss of the General Electric Co., San Francisco.*

HOW BIG IS TAPE?

How big is tape? Just as big as the broken wire it restores to service on the battlefronts... or the tank, plane or ship it helps to build. Big enough for it to be important that the Armed Forces and the War Industries have first call on our production of U.S. Friction and Splicing Tape.

A single roll of tape is a very little thing. But it takes millions of rolls of tape to splice electrical connections in our jeeps, tanks, ducks, fighters, bombers, PT-boats, anti-aircraft batteries. Remember, too, that Security Friction Tape is on the job in acres-big bomber plants, shipyards, foundries, steel mills, munitions works.

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20

Free Enterprise

WHAT IS IT? HOW DOES IT WORK?

☆

OURS is a free-enterprise economy the chief motivating forces of which are the prospective rewards for effort and risk-taking. Its smooth operation depends: first, on adequate incentives for risk-taking, innovation, and individual effort; and second, on sufficient competition to minimize the need for government regulation and to prevent artificially high prices or wages from being maintained in large segments of the economy. Trouble comes when these incentives and this competition are tampered with or removed.

America was founded by men who had the urge to better themselves and the courage to take a chance. These men uprooted themselves in Europe and braved the unknown. They risked all for freedom. They knew that, to be free, they had to attain economic freedom. Their goal was an economic freedom which permits the private ownership of property, the free choice of jobs, and free entry into entrepreneurial pursuits. Their efforts, therefore, were directed toward individual opportunity with no limit on individual achievement. Their foresight and the endeavors of those who followed them created the world's greatest industrial nation enjoying the highest standards of living.

We can take pride in the knowledge that our country has been the greatest single contributor to the world's physical assets even though we remember that an abundance of natural resources contributed materially to America's economic development. But the fact that our progress has been interrupted, again and again, by depressions which resulted in enormous wastes of our human and material resources is sobering proof that our economic mechanism still is far from perfect.

Our production per man-hour has been increasing at the rate of 2½% per year. Improved machines and greater efficiency have more than tripled the output per hour of work since 1900. Looking to the future, this annual rise indicates that our production per hour of work will double in the course of the next 25 to 30 years. This means that we can have twice our present volume of goods and services per capita or an equivalent combination of more production and more leisure. In other words, we can further increase the living standards and further decrease the working hours of the American people by further intensifying our industrial efficiency.

This is no idle dream. It can be achieved, and it will be achieved, if only we maintain the essential features of our system of individual enterprise which alone makes possible this near-utopian goal. Intensification of our efficiency, however, means that we can have full employment only if we expand enormously our production, and particularly our production of new goods. We can expand total production only if we have the markets and the demands for the vast output of goods and services made possible by our technological development. To attain these, we will need to venture into new markets, new inventions, and new methods. Such ventures involve risks, and risks will be taken only if there is sufficient prospect of reward.

Let us never lose sight of the fact that the essential features of free enterprise are the prospective rewards for risk-taking as well as for effort.

The evidence is clear that incentive methods of wage payments will boost production. Carefully devised systems of salary payment with large differential inducements for superior performance have been powerful means of raising the standards of managerial accomplishment.

Free enterprise cannot operate effectively unless the wage and salary system offers greater rewards for greater effort. Neither can it operate effectively unless the prospects for profit are sufficient to encourage the employment of resources which otherwise would be kept idle.

Unless the prospects of profit are superior to the prospects of loss, new ventures will not be undertaken and going concerns will not expand or continue long in business. When the hope for profits wanes, employment and production slump; when that hope revives, employment and production recover.

Business initiative must be given every possible in-

ducement in order that maximum employment may be achieved through private enterprise. This involves the removal and avoidance of restrictions on business by government, by labor, and by business itself.

Competition is the life-blood of the free enterprise system. Business and industry must rely upon efficiency rather than upon protection from competition for their survival.

Those government controls which were made necessary during the war by the magnitude of government demands for goods should be lifted at the earliest possible moment. As soon as the danger of inflation has receded, price controls must be removed and profit margins again left free to be determined by market forces. The excess profits tax must be repealed and the burden of other taxes on business profits greatly reduced. Tax laws should be revised so as to permit adequate rewards for assuming risks. The modernizing of anti-trust laws and their vigorous enforcement, not indiscriminate persecution, will be supported by all who really want free enterprise. Such measures will strengthen the incentives to expand old businesses and to start new ventures.

Grants of unlimited monopoly powers to labor unions which enable them, consciously or not, to sabotage the profit incentive in business must be withdrawn. Labor has certain legitimate rights; and in order to preserve them and its freedom, labor must come to realize that its best interests lie in a well functioning, self-disciplined competitive free-enterprise economy.

There must be evolved in the minds of business, labor, and the public a recognition of the need for private business enterprise and a realization that policies which throttle it are harmful not only to businessmen but to workers and consumers as well. Unless we achieve this understanding and avoid needless deterrents to business expansion, we are likely to pay for our folly in the destruction of our free enterprise system.

We cannot tolerate conditions in which special interest groups in business, labor, agriculture, or politics prevent free access to the market by would-be competitors. Such monopolizing of opportunities stifles progress and creates profits or wage rates based on artificial scarcity. In such cases government interference to open the market to all comers is clearly indicated. We must recognize the need for constructive policies by business, labor, and government which will insure the competition necessary for the successful operation of our economy.

Increased government regulation and control of business activities is not conducive to strengthening the virility of private enterprise. Government ownership and operation of productive resources certainly is not to be condoned. The more government rules and regulates business, the less will be the incentive to assume risks and to exercise individual initiative. Government regulation of the detailed operation of industry inhibits progress, is prey to political pressures, and is subject to the human failings of its administrators. *Better far the rough guidance and justice of vigorous, though somewhat imperfect, competition than the uncertainty of arbitrary regulation.*

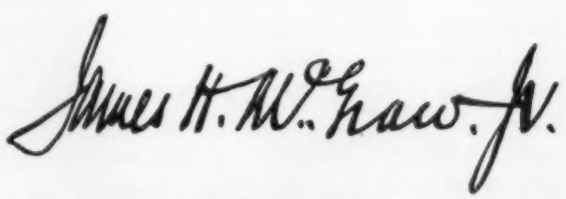
The gravest threats to our competitive system exist in legalized monopolies, such as the N.R.A. once comprised, such as the labor unions and farm groups have recently achieved, such as businessmen themselves have sometimes sought. The power of labor monopolies to encroach on business profits will tend to interfere seriously with the needed flow of new investment. And when any group is strong enough to move the average level of costs as much as the labor groups and the farm groups are able to do, there is good reason to fear that, when we begin to approach high levels of employment and production in time of peace, these groups will induce a price-wage spiral which will waste money incomes on price increases instead of permitting them to draw unemployed resources into production. While the demands of labor for collective bargaining rights and the demands of farmers for protection against the rigors of depression have validity, there can be no reason for excessive grants of power and privilege which threaten to make our system of free enterprise unworkable.

Ours is a complex economic structure. The functions which prices, income, savings, investments, and taxes play in this system are difficult to comprehend.

As I have said before: Thinking is hard work, and we will have to work hard if we are to develop business policies, labor policies, and government policies which will insure full employment and the opportunity for consistent profit. Yet only through such policies can we guarantee that private enterprise will be the predominant source of jobs, income, and production.

Even more difficult than thinking, and more important, is the implementation of many policies that are in the interest of the free enterprise system. Not all measures will satisfy all people. Special interests will have to be subordinated to the total interests of the nation. Sacrifice and vision have been essential to the winning of the war. They will be no less essential to the winning of the peace.

If we can gain recognition of the crucial role of incentives for enterprise, if we stand squarely for competition and against protection or privilege for special interests, and if we bend our efforts to find satisfactory ways and means to prevent large-scale unemployment, we can have the full benefits which only a free enterprise system can produce—in industrial progress, in improved standards of living, and in the preservation of our democratic ways of life.



President, McGraw-Hill Publishing Company, Inc.

YOU'RE LOOKING A LONG WAY AHEAD *when you supply . . .*

CHAMPION *Lamps*

Furnishing dependable *Fluorescent* and **Incandescent** Lamp replacements is one of the most valuable services you can perform for customers now engaged in war work . . . At the same time you are building steady volume and profits for years to come when you supply lamps of

1. **Champion Quality**—guaranteed to equal or exceed Federal Specifications.
2. **Champion Responsibility**—the product of one of the largest and soundest manufacturing organizations in the lamp industry—specializing in fine lamps exclusively since 1900—equipped with every testing, engineering and development resource.
3. **Champion Service**—trained men in the field ready to help on any lamp or lighting problem.
4. **Champion Economy**—the *diamond* mark on every lamp means lower light and lamp costs than any other lamp of equal quality.

CHAMPION LAMP WORKS

Lynn, Massachusetts

A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO.

Speaking of Post War Selling

There Are Three Big Markets Fo

Constantly expanding war-time uses of fans and ventilating equipment in industry are creating definite "good air" and "ventilation"—consciousness among millions of workers—are piling up vast future sales opportunities

PICK up the Want Ad section of your daily paper any day and you will find industrial plants seeking help, making such statements as

"PLEASANT AIR CONDITIONS in Modern War Plant."

"Girls and Women Wanted in Our AIRY SANITARY BAKERY."

"WELL VENTILATED, Well Lighted Surroundings."

Industry is finding out, now that it has to compete for help, that good ventilation is one of the most important requisites. Obviously industry is going to remember this permanently, because when people have worked in good air condition, they naturally will never be satisfied with poor conditions. Furthermore it will have a lasting effect on the entire market for ventilation.

The steady spread of ventilation can be traced alike in the industrial field, the commercial market and in the home field. Let us look at this development because it foretells the tremendous demand that is being stored up in all three fields.

The Industrial Market

Consider first the industrial field because that part of it that is tied to the war effort is right now a tremendous ventilating market. Ventilating needs can be divided into two classes, first the critical needs and second the ordinary or comfort needs. Critical needs for ventilation can be defined as those requirements which simply cannot be disregarded because of health laws created by government bodies as well as those set up by a simple regard for the well being of the worker as a part of the production army behind the men at the war plant.

Example of critical ventilation needs in industry are removal of fumes in plating operations, dust from grinding and sand blasting, exhausting of paint spray fumes, and of heat and steam from operations involving furnaces and boiling tanks. Unless good ventilation by means of rapid air change is provided in these and many other similar operations, the worker cannot turn out the expected production; he may sicken and even become completely disabled.

Federal labor laws require that

s For Ventilating Equipment

By C. W. Dexter*

management not overlook provision of good ventilation for many of these operations. Good management has learned that good ventilation is a production tool which always more than pays for itself and ventilating fans and blowers are in regular use in these plants.

Distinguished from the critical need for ventilation for instance is the case of the machine shop or the assembly floor, the office, the toilets and drafting rooms. Men and women can do their work there without consideration of good ventilation:—that is to say the effects of poor ventilation is not so spectacular, so quick, and so ruthless. *But it is still there* to quietly sabotage 5 percent or 10 percent or 20 percent of the shop or office worker's energy and production capacity, and, equally important, his enjoyment in this work.

Once upon a time the open window was considered a good remedy for poor ventilation just as natural daylight was depended upon to light all daytime shop operations. But just as daylight proved itself undependable and erratic and insufficient so has the open window been superseded by the ventilating fan for complete assurance of draft-free dependable ventilation. A 30-inch, 36-inch or 48-inch ventilating fan has proved the case in many a shop.

As good ventilation standards rise, as they are doing year after year, it is interesting to see that more and more ordinary ventilating requirements that were formerly overlooked are now considered critical in nature, so that the market for ventilation is growing by leaps and bounds. Not so many years ago foundries paid no attention to the smoke problem. Today, an installation of ventilating fans to provide rapid exhaust of the smoke is a "must" with them.

Once upon a time no one cared if workmen in front of furnaces or up under a steel roof in a crane cab had to endure a heat of 120 degrees or 130 degrees. Today ventilating fans are installed as a routine procedure. All over industry good ventilation is recognized as good labor practice and plain good sense.

It is but a natural development therefore for today's war plants to consider that every part of its operations require good ventilation for its workers. Where a given plant once considered was a market for one or two fans or blowers it has now become a steady customer for many pieces of ventilating equipment as new production and personnel problems develop.

It is interesting to note that as the ventilating fan has become a staple among the equipment in the industrial plant, the electrical wholesaler, as would be expected, has grown larger and larger in the picture.

While it still is true that the wholesalers' salesmen must call in the help of the ventilating manufacturer's salesmen to assist in working out the occasional ventilation problem which may involve complication, most of today's and tomorrow's industrial ventilation needs can be sold out of the catalog and instruction book.

To the extent therefore that the electrical wholesaler salesman will look for and ask for ventilating fan business as he makes his industrial calls, he can gather to himself an increasing share of this growing market.

The Commercial Market

Let us take a look now at the commercial market for ventilation, a field which is in the process of building up a tremendous demand for after-the-war release.

Twenty-five years ago about the only public place that was certain to be ventilated was a restaurant because restaurants had already found out that they simply had to ventilate their kitchens to keep the smell out of the dining room. Today it is unthinkable to open up a restaurant without good ventilation and that means a 30-inch ventilating fan where a 16-inch fan was once and one or two 36-inch or 42-inch fans used where a single 30-inch fan

*Advertising Manager
Ilg Electric Ventilating Co.
Chicago, Illinois

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  Round window or **light slots** 6, 13, 18, or 24 inches long.

  Two or more units may be **tandem mounted** to give a continuous shaft of light.

  Listed in Condulet Catalog No 2500 Section 25 Pages 17 and 18

- **Explosion-Proof** gauge lighting Condulets for use in Class I, Group D, hazardous locations.

  Fluorescent lamps, Lumiline lamps or tubular lamps.

  Light slots 7, 14, or 17 inches long.

  Two or more units may be **tandem mounted.**

  Listed in Condulet Catalog No 2500 Section 85 Page 16A

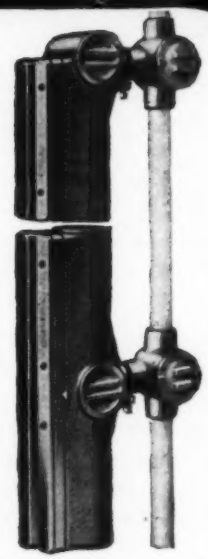
- **For ordinary locations**— Type LG gauge lighting Condulets for use wherever vaportight or explosion-proof fixtures are not required.

  Incandescent bulbs.

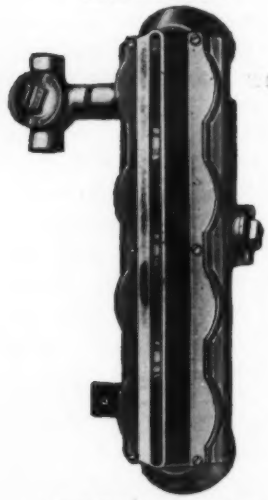
  Round or rectangular light opening, horizontal slot or vertical slots 5, 8½, or 13 inches long.

  Installed with rigid conduit, round flexible cable, flexible conduit or armored cable.

  Listed in Condulet Catalog No. 2500, Section 55, Page 13

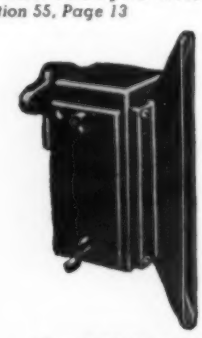


Type ELG Explosion-Proof Tubular Lamps 7 and 14-inch Units Tandem Mounted



Type ELG Explosion-Proof Fluorescent or Lumiline

Type LG With Hooded Rectangular Light Opening



Type VFC Vaportight With Flanged 13-inch Slot

Type VLG Vaportight 18-inch Unit Fluorescent or Lumiline

Type VLG Vaportight 24-inch Unit Lumiline

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was once considered sufficient to use.

The same thing is becoming true of drug stores, chain stores, theatres, halls and even churches. It simply means that John Q. Public has learned that a public spot that is well ventilated is a more enjoyable place to be than one which is not ventilated. Now we are passing through a war period during which the flow of equipment to such buyers is completely dammed up because ventilating fans are available only to those who can offer priorities.

It is not difficult to picture what will happen as ventilating fans once again become available to the commercial market. With much previously installed equipment worn out, with ventilating standards appreciably higher than when we went into the war, millions of dollars will be spent for new and larger ventilating fans.

Now is the time for the forward looking wholesaler salesman to make his plans with his electrical contractor to get that business. Keeping contacts alive is the number one job. You may not know how long the war will last, or what kind of equipment will be needed or available when peace does come but you do know that the electrical contractor is going to install ventilating fans when that time comes.

The Home Market

And now we come to the home market for ventilation. It is a tremendous field and there has been a great deal of speculation about it. All kinds of surveys are making the rounds to determine what types and sizes of houses will be built after the war, whether the prefabricated house will be of major importance; how many new homes will be built and what kind of equipment will be used in them.

In considering ventilating prospects in the home field however, we do not need to care whether 200,000 homes, or 500,000 homes or 1,000,000 homes a year are built, for we know that whether it be an old home or a new home there is a relatively unscratched market for kitchen ventilating fans, attic home cooling fans, bathroom and recreation room fans.

Millions of homes of the type that have electric refrigeration do not have a kitchen ventilator. These homes constitute your number one market for a built-in wall type or portable window type fan. A recent survey among power companies showed that kitchen ventilation saturation ran from ½ percent to 5 percent in area after area.

Practically every utility company with this in mind, has kitchen ventilation on the list for after the war promotion. They recognize in the kitchen ventilation a load building device that's in use three times a day, 365 days a year, a good companion item for electric refrigeration and electric ranges.

The home cooling fan of the attic and of the portable window types was just beginning to make its volume felt when the war began. Beginning in a modest way over 25 years ago when the first installation recognizing the night cooling principle were made, its steady growth had reached a point by 1941 where men were saying everywhere that here was the way to cool the home at a price to fit the ordinary purse. The results proved the case, for the attic fan method of home cooling invariably exceeds the purchaser's expectations and provides the full answer to his demand for hot weather comfort.

After the war there will be several different types of home cooling fans available, all operating on the night cooling principle. They will include fans for building into the attic of new homes, portable fans to move in front of any window and fans for quick installation in the window.

Both the appliance dealer and the electrical contractor will find the attic fan, like the kitchen fan, has ready acceptance in a big and growing market. If they are wise they will build their home ventilation and cooling business on a solid foundation by identifying themselves with quality merchandise that offer full profit margins and dealer protection.

The electrical wholesaler's interests lie in the same channels.

Electrical ventilation has shown itself to be a real war necessity justifying the highest priorities. When peace comes there is every indication that it will be a volume builder and, better yet, a profit maker for the electrical wholesaler who rolls up his sleeves and pitches into this fascinating business.

All Ilg Electric photos.

With No War Plants To Serve

This Wholesaler Found Plenty Of War Service Opportunities

Located in an area devoid of large-scale arms production, this wholesaler manages to contribute his share toward the war effort

By Harrie H. Bierman

ALTHOUGH not standing directly at the assembly line of the Nation's "For Victory" effort, the independent wholesaler nevertheless plays a highly important—but, usually, little publicized—part.

Often, he supplies the essentials, without which America's war mechanism would fail to function smoothly—if at all. Sometimes, the service he is called upon to render consists of locating a supply source of apparently non-available but badly needed material. Frequently, it consists of furnishing technical information to some contractor faced by a new and tricky wiring, lighting or powering problem.

Like electrical wholesalers, generally, McDonald Electric Company, Inc., pioneer wholesaler at Miami, Fla., has converted from a peace to a war-time handling of its business. While in many areas wholesalers have contributed to the electrical equipping of vast plants for the mass-production of ships, aircraft and mobile armament, South Florida's place in the over-all picture has been—and still is—what our British friends call the "bits and pieces." These consist of the individually small assignments which however form vital parts of the big task.

For instance, a South Florida marine construction company undertook the conversion to war use of craft previously employed for pleasure and commercial purposes. Included in the extensive alterations made on these vessels in readying them for their new duties were many changes in and additions to existing electrical installations.

Electrical work in a residence or an office building is one thing. On sea-going craft it is something else again. In respect to the latter—particularly smaller vessels—two factors which always must be considered, are wave shock and engine vibration. And, on a boat at sea with a "task" to do, an electrical connection shaken loose may be more than inconvenient. It can prove serious and even fatal.

All this may seem obvious enough until one considers that the "obvious" may not be that to men drafted from other kinds of electrical installations and other types of ship construction to do a rush job at remaking peacetime craft into war vessels.

Consulted on the matter of electrical connections which could be depended upon to "stay put," McDonald Electric recommended solderless pressure-terminals. In the types used these connectors could be applied by a hand tool expressly designed to handle them in various sizes.

So satisfactory did solderless terminals prove to be that, when the marine construction firm mentioned, finished its conversions and turned to other types of boat building, the company continued to use vibration-resistant pressure connectors for electrical installations. In the meantime other South Florida boat-builders also had begun to employ pressure lugs of the same kind. As a result, during the past two years McDonald has sold nearly 200,000 solderless terminals of various sizes.

The necessity for vibration-resisting qualities in electrical items used on small sea-going craft applies to lamps, as well as to connectors. Recently, a Navy Lieutenant, commanding a converted pleasure yacht assigned to special patrol duty, came to McDonald Electric for a quantity of lighting fixtures and lamps.

Having 24 hours in port before going back to sea, the patrol-boat

commander was anxious to make some lighting installations. Moreover, he wanted advice as well as materials. He had available an electrician competent to do the installing but his man was accustomed to working on large buildings, and, therefore would not recommend the type of lamp best adapted for marine use, particularly in heavy seas.

The Lieutenant knew where he wanted fixtures installed, and, in a general way, knew their type. But he had no wiring plans, not even a sketch of the fixtures he had in mind. However, from the Navy officer's verbal description McDonald's fixture salesman, Harold Wagner, made a list of the fixtures and lamps which best would fit the uses intended. The materials were delivered and installed and the patrol-boat skipper put to sea on schedule, highly pleased with his initial excursion into electrical-supply-buying.

Never before in the war history of the United States have the various branches of the Nation's Armed Forces required so many shallow-draft boats—and of so many different types. In order to supply needed volume boat-building plants have sprung up in unexpected places. In one such instance, the contracting firm previously had been engaged entirely in building construction work. In undertaking the production of small boats this company had to start from scratch.

The most available location for the latter was a tract of land comprising several hundred acres, and vacant except for a large, shed-like structure, long unused and intended for a vastly different purpose. The latter, the prospective boat-builder planned to remodel. However, part of the "plant" would be out in the open with only processing equipment housed over.

Obviously, manufacturing operations require electric current for lighting and for the powering of fixed and portable producing equipment. Included in the materials needed for the job were 45,000 feet of conduit, ranging from ½ inch to 3 inch, 150,000 feet of wire in sizes from No. 12 to 500,000 cm. and panel board equipment for 8 current-distribution centers (including one "main").

Lighting requirements included 44 stack-and-bin and 33 fluorescent fixtures for stockroom use alone. Installed in one enclosed shop-section were 70 units, using 200-watt, clear glass Mazda lamps, while in another there are 30 units of 2-lamp fluorescent fixtures. Twenty-two flood lamps of 300-watt and 500-watt capacity were needed to provide protective lighting.

Of the total quantity of material and fixtures used McDonald Electric was able to supply approxi-

Remodeling of pleasure craft for war use requires extensive changes in the electrical installations. This wholesaler found that solderless pressure terminals proved highly satisfactory in resisting vibration from power plants and wave pound.

mately two-thirds. And as the result of "teamwork" between electrical contractor and supplier, the boat-builder was able to bring production off the assembly line 28 days ahead of schedule—a worthwhile "For Victory" accomplishment in which all concerned took pride.

In the Greater Miami area, "conversion" has not been limited to seagoing craft, alone. Many buildings —hotels, office structures, night clubs, restaurants and even garages have been converted to "military use." Here again, the change-over necessitated alterations or additions or both to existing electrical installations.

Much of this work was done by electrical contractors, while the remainder was carried on by electricians in the direct employ of the military authorities. In practically all cases, however, electrical wholesalers have been the sources of supply.

And in connection with this type of "conversion," too, McDonald Electric has been able to render valuable service. The latter includes not only the supplying of routine items, such as wire, conduit and switches, but also special equipment and technical information And in respect to the last-named, be it remembered that we live in an age of specialization, in which no man—no matter how competent—can be expected to be familiar with all branches of electrical installation.

As a case in point, an inter-communication system of the public-address type was needed in an office building being conditioned for "military" occupancy. Thumbing over his catalogs, a McDonald salesman found listed exactly the right kind of equipment wanted, and his firm was able to procure delivery.

When installed, however, the apparatus failed to function as satisfactorily as it should. Knowing the details of the building's construction, the McDonald organization diagnosed as the cause of the trouble the high steel-content of the building, itself. At the request of the authorities interested, the company called in a local radio expert. Familiar with such conditions, this technician was able to put the system into perfect working order.

Trade literature, too, has been used extensively in solving supply and technical problems. "Never before in the company's history," declares A. H. McDonald, firm-member and sales manager, "have catalogs and informational handbooks been so helpful to us as they are right now. We regard our collection of such publications as a "technical library," and we would be seriously handicapped, if we had to do without any part of it."

Thus, by supply material and information, when either or both are needed most, McDonald Electric Company contributes its share to the "bits and pieces" essential to the functioning of the Nation's All-Out War Machine.

Things to Know and Watch—

In Termination of Government Contracts

By Roy Worth*

ONE year ago last June I started talking and writing letters about the problem we would face when cancellations started to come. Today it is seriously considered by many and yet I doubt if more than a comparative few realize how far reaching the results may be. If not the most critical, this is certainly one of the most critical problems we have to face, as we approach the end of production for war.

The expenditure for War Production in World War I was about $21,000,000,000. At the close of that struggle the cancellations of uncompleted contracts amounted to approximately $7,500,000,000. We are already committed in this war to an expenditure of $240,000,000,000. The estimates for cancellations are now placed at from fifty billion to one hundred billion. We are becoming so calloused to large figures that I am afraid this doesn't stagger you as it should.

You are interested in this from two different angles; first, as it may affect your own particular company as related to the direct contracts you have with the government and second, the condition it may place your customers in when their contracts are suddenly terminated. I might have added a third and possibly just as important, that is, the general effect on the entire economic structure of the country and on its ability to convert to peace time production and perform the job we would like to see in giving employment and avoiding a serious recession and its attending consequences.

Don't think that this is something that can be put off, for already we are beginning to see some of these cancellations right here in Los Angeles.

Following World War I, the settlements amounted to 13 cents on the dollar, of the amounts claimed. Cases which did not go to litigation were settled on the average in two years; under litigation, 3½ years. I understand the last case was settled within the past year.

MANY TERMINATIONS

Over a month ago one procurement agency alone reported the termination of 3,764 contracts. More than 2,300 of these unsettled. Four hundred of these remained unsettled after 6 months and in only 44 cases had advance payments been made to the Prime Contractors. Financial embarrassment can not help but follow such a situation. I know of one case in our line where a recent cancellation of a $35,000 order is under negotiation, and the factories cancellation bill is $31,000. The product is special and it is questionable if it can be diverted to any other use. I heard of another involving 7 or 8 thousand dollars, where the finished product is in the wholesaler's warehouse and delivery is refused by the prime contractor. This is very technical apparatus and not salable.

In one of our local meetings held to discuss some proposed changes in the Termination clause, as it appears in government contracts today, one of those present brought out a good point that is overlooked by others in dealing with this subject, namely, that they were being handicapped in further operations by the loss of the space necessary to store the finished product for which an order had been suddenly cancelled. You see you must hold this until the government agency gives orders for its disposition.

BANK HAS VIEWPOINT

Let me give you the view of another as to the importance of this problem. I quote from the monthly publication of the National City Bank of New York.

> "In the growing amount of discussion of the post-war economic situation, too little public attention has been given thus far to the question of settlement of war production contracts when the war ends. Many people may think this a matter of little general interest, concerning only the Government and the armament producers. Actually, it concerns the whole country. For there is involved the question whether the industries will be able to take up peacetime work quickly after their war work is over, or whether their working capital will be frozen in war production and its release subject to interminable delays and litigation.
>
> "This concerns a great many people. It concerns the possibly twenty million persons who will be working in the war industries, most of whom will need peacetime jobs after war production is suspended. It concerns the millions in the armed forces who will be back looking for work after peace is restored. It concerns all who sell to the industries now producing war products, and all who will be looking for a market among their workers."

Now what is being done about this and where should our interest center. Let me say before proceeding further that from the contacts I have made and all the publications and expressions, there is every indication that the government wants to handle these cancellations fairly and promptly and as far as present rules and regulations permit they are doing this.

The War Department, under date of August 14, 1943, issued Regulation No. 15 dealing with "Termination of Contracts for the convenience of the Government". I have a copy of this here. It contains about forty pages and goes into some detail as to all that must be done in handling the various steps of a termination settlement. I have not had the time as yet to study this fully. A few quotations however are interesting at this time.

LEGAL BASIS FOR TERMINATIONS

"The authority to terminate contracts for the convenience of the Government is based upon the general authority and power of the War Department to make contracts and to amend them in the interest of the Government. The right to terminate a contract for the convenience of the Government by unilateral action of the Government ordinarily is reserved in the original contract or inserted therein by supplemental agreement. However, even in the absence of a termination article, a contract may be terminated for the benefit of the Government."

DUTY TO TERMINATE

"Paragraph (a) of the standard termination article (PR 324) for lump sum supply contracts requires that the prime contractor 'cancel all existing orders chargeable to this contract,' except as directed otherwise by the contracting officer. This obligation of the contractor should be performed immediately upon receipt of the notice of termination. Settling with the subcontractors and suppliers then becomes an obligation and responsibility of the contractor, subject to the approval of settlements by the contracting officer."

RIGHTS OF SUBSCONTRACTORS

"Under the standard termination article (PR 324) for use in lump sum supply contracts, subcontractors and suppliers have no direct rights against the Government upon the termination of a prime contract for the convenience of the Government. The rights of such subcontractors and suppliers are against the *prime* contractor or intermediate subcontractor who is directly obligated to them on the subcontract or purchase order which they hold. The extent of these rights will generally depend upon the terms of the subcontract or purchase order in question.

"The contracting officer in his discretion may authorize the prime contractor to make settlements of subcontracts within some stated figure, where the contracting officer has confidence that such authority will be exercised fairly and reasonably. The contracting officer ordinarily should not require that settlements made by subcontractors with second tier and more remote subcontractors and suppliers be submitted for his prior approval, although he may do so and he may give such approval in any proper case when it is requested. Such settlements should usually be approved after they have been made unless in particular instances the settlements appear to have been made in bad faith."

You have heard reference made to the work that has been done and suggestions made to a special committee of the War Production Board which has been, and I believe still is, working on a redraft of the Termination provisions of Government contracts. One of the latest things that has come to my notice would, if adopted, be of great help to the small business; this is a proposal to permit up to $10,000 to be settled by the contractor without securing the contracting officer's approval. If this should be authorized by a Presidential Directive, it would hasten settlement of thousands of small claims and permit the small business, which no doubt will be the one most seriously harmed by cancellations, to have its capital available promptly for use in reconversion and launching activity on peace time production.

It is my view at the present time that help on this problem may come from the report of a Senate Committee on American Small Business. As I understand it, this committee has been making a study and survey of the problems of American Small Business and in their report to the Senate when it convenes in September, will make recommendations regarding the question of Termination of Contracts.

Senator Murray has already made a preliminary Report dealing with this subject. The Bill which the committee is proposing makes advance payments to contractors and subcontractors mandatory rather than discretionary. It also requires the department involved to pay to the contractor, within 30 days after he has filed a demand, 75 percent of the amount certified by him to be due. A similar provision is made with respect to the holder of a sub-contract.

This bill also authorizes the procurement agencies to make loans to contractors or subcontractors and to purchase or acquire assignments of the rights of subcontractors. In effect this would allow a direct settlement with subcontractors.

I feel that we should give every support to Senator Murray's committee and this bill, and that we might urge inclusion in this bill of the proposal to allow of the settlement by prime contractors of subcontractors claims up to $10,000 without awaiting the approval of the Contracting Officer.

Now a few suggestions as to things that can be done in your own organizations—

1. Keep your credit information up to the minute. This is essential now and will be helpful for the post war period.
2. Insist on prompt payments—if your ledgers and those of your customers are clean, you will have greater success in the Post War Period. I hear that in the Middle West many industrial companies have changed their terms to requirement of payment twice a month. This is worth considering by us. If you wish to help your customer, encourage him to keep out of debt also.
3. Press for a completion of all the details to finishing any of your contracts. I mean by this—get the last item shipped, and get your bills out. You are in a much better position when a cancellation comes if everything is completed, than if a few stragglers remain to be cleared up.
4. See if all your records are being kept complete. When cancellations come you will find the details to be supplied with your cancellation charge are many. You should record exact date of receipt of cancellation and support the record with proof that manufacturing stopped promptly; that you made proper cancellation with your suppliers. The forms you will be required to fill out call for this, and accurate information on the progress of the work, the costs of material and labor, including rates paid, etc.
5. See that material applying to the contract is set aside, marked, and held for instructions as to its disposition.
6. Start promptly to prepare your claim. It will probably be a case of first come, first served. The claim that is complete and carefully prepared will no doubt get the preference.

I have tried in the time allotted to give you a picture of this problem; many details might be added and much could be said to enlarge and possibly make the picture more vivid. However, if this results in your starting to think about this problem and to discuss it with your executives, there will be an aroused interest, as the dangers and disasters will certainly be discernable.

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* *An address, delivered by Roy Worth, Secretary of the Electric Corporation of California, before the Building Material Dealers Credit Association, Mayfair Hotel, Los Angeles, California*

What's Ahead in LIGHTING

By Samuel B. Williams*

LIKE everything else, lighting promotion will pick up after the war where it left off when material shortages brought limitation orders. There will be a few new pieces of equipment, but generally speaking there will be little change at the beginning.

This, however, isn't going to last for long because the war influence and some trends that were started before the war are going to be reflected in some marked changes. Just what these changes will be is, of course, not known. We do know, however, the direction they will probably take.

Design

Starting a long time ago and picking up momentum during the war is a trend toward simplicity. We find this in architecture and music and we shall find it greatly emphasized in lighting. Obviously, great forests of large hanging fixtures do not harmonize with any such trend.

The linear sources lend themselves to this trend, provided the designers can be separated from their past alliance to incandescent sources. Design based on filament practices has but emphasized all of the defects in appearance. This will be corrected.

Practice

In one aspect the war was fortunate in that it gave people time to think before the pendulum swung too far to the side of higher lighting levels as the only measure of good lighting practice. How far can we go in upping the foot-candles before we bump into some danger signals? We are at the point now where people are beginning to say not quantity but quality first. The light must be comfortable.

This, plus the new sources with their own problems, plus the changes coming in application of light, have made it apparent that while there may be more standardization in lighting practice, there will be less of the sameness to layout. Another way of saying the same thing is that emphasis will be placed more on lighting and not so much on the fixture.

Samuel B. Williams

Obviously this is a job for a trained illuminating engineer, and we have every reason to expect that in the future more and more lighting jobs will have benefit of consultation with an experienced illuminating engineer.

Education

But the bulk of the jobs will have benefit only of the knowledge of the salesman. To do this job with any degree of success he must know a lot more than he does now. How will he get this knowledge? That's one of the major problems that faces the lighting industry. More people are realizing the importance of a program of education in the fundamentals.

This is a program that should take the first position in any planning. Unless we do it now we may find ourselves in a post-war market that leaves no time for individual improvement. It's very hard to convince salespeople that they need to know more about the products they are selling when the business is so good it almost flies in over the transom. These post-war jobs must be done right if we are to maintain our hold and that is going to require a sales force better equipped with an understanding of fundamentals.

Nor are the salesmen alone in needing reeducation. There are the groups of consultants in the traffic field and architects and merchandise managers and industrialists, who, worse than not knowing, have in too many instances a little knowledge, and that we know is a dangerous thing.

It begins to look as though the means used to educate these people either did not take or else it was spread too thin to be of any real benefit.

War Riches

From the war itself we shall get riches. The industrial field, for instance, always backward on lighting, has taken the lead away from other prospects. It is the big and shining example of lighting benefits when enough light is used. Are people who have worked in these well-lighted war plants going to be satisfied after the war to work in semi-darkness? The answer is obvious. War industry lighting has without a doubt pushed lighting not only of industry, but all other occupancies, ahead by almost a full decade.

Wiring

Not all of the war plant lighting will remain as is after the war for several obvious reasons. Some better equipment may be used and the wiring in many instances will be changed for

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* *Editor*
ELECTRICAL WORLD
McGraw-Hill Publication

The article of which excerpts are presented here, was originally published under the above title in the special lighting issue of ELECTRICAL WORLD, July 24, 1943.

Reading it disclosed that Mr. Williams had done a masterly job of analyzing and summing up and, after obtaining Mr. Williams' permission to reprint, we planned to include the article *en toto* in our September Lighting Show *IN PRINT* issue.

Unfortunately unexpected developments and the present paper situation prevented execution of that plan, but, to make sure that Mr. Williams' fine contribution to present knowledge of the lighting market would not be entirely lost to our audience, we are publishing here excerpts that are considered of particular interest to electrical wholesalers and salesmen.

The Editor

more local control. There may even be changes in types of illuminant.

From the war necessity for conservation we have received some new ideas on wiring and on voltages for lighting circuits. The inertia that coupled 110 volts to lighting so long as filament was used appears to be broken.

Some substitutes and some practices came out of the war that may find their way into peacetime use.

Sources

The light source of the future is definitely fluorescent but there will be early changes—changes brought about very largely by the insistent demands of the customer. It hasn't been easy after a lifetime with trouble-free incandescent lamps to accept quietly the auxiliary troubles of fluorescent tubes. The troubles, however, will all be cleared up reasonably quicker, even if it means some different tube characteristics.

It is interesting, however, that two conflicting forces springing out of the war will stimulate desire on the one hand through experience in the modern well-laid out lighting, while reduced light in the dimout and blackout can be expected to create desire because of want. A light-starved people in our coastal areas may have learned how to get along without light, but they have also learned how to get along without butter and roast beef and coffee and silk stockings and pleasure driving. Does anyone think that these lacks will be permanent just because people have learned how to get along on less?

Markets

From this vantage point lighting looks like one of the "naturals" in immediate post-war markets. Hardly a phase of it does not present possibilities. Furthermore, if we take the long-range point of view we must not forget that virtually everything installed pre-war is now obsolete, or will be obsolete by the time we get around to it. In other words, the long-range market includes the complete relighting of America—and we can't wait too long to get it done. That really is something to get enthusiastic about.

The more detailed analysis of future trends in lighting contained in the following pages represents the combined thinking of more than two hundred manufacturers, engineers, lighting specialists for utilities, architects, traffic and highway engineers, department and chain store merchandisers. It was interesting to see how often a number of people widely separated by location and occupation had arrived at the same conclusion.

This study is offered in the hope that it may be of service in organizing the preparations of the lighting industry for the post-war market.

MARKETS

THE feeling is rather general that there will be a large demand for improved lighting, although there are some who believe that the dimout has taught people how to get along with less light, to overcome the effects of which will require more intensive promotion. On the other hand is the point of view that in the light-starved areas people will be so hungry for light that they will go to the other extreme. There is no denying, however, that there is a large and growing backlog of war-deferred buying. All who were unable to get new lighting equipment during the war are quick prospects.

One thing is recognized and that is the ability of the manufacturers quickly to get back into production. For the most part they will not have to go through any reconversion process but will be ready to turn out equipment as fast as they can get material. This would seem to put the lighting industry into the market earlier than most others and in a position to be one of the first to take advantage of the pent-up civilian buying demand.

Not all markets are viewed as offering the same post-war opportunity but there is a general agreement that the commercial lighting market will be the first to come back.

Is Price Going to Be a Factor?

Among certain architects and utility salespeople the cost of fluorescent fixtures is held to be detrimental to relighting in large volume. Possibly some further attention to repetitive manufacture will bring lower costs.

What Are the Possibilities for Standard Fixtures?

There is a definite trend toward standard chassis. In fact, there is good

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GENERAL ELECTRIC

reason to believe that much of the concealed lighting will be done in a tailor-made manner using standardized equipment.

Will Voluntary "Brownout" Leave Any Permanent Scars?

Not necessarily. This conservation scheme, which, when the details are released, will probably be felt to be more severe than the dimout, should have a little different effect from the dimout so far as post-war buying is concerned:

The dimout is not concerned with fuel saving—merely prevention of light from adding to the skyglow. The brownout is exactly the opposite, which should mean, if it is to be practically effective, a reduction in lighting hours. There is little change in lighting technique under such a condition—only a reduction in time. It doesn't, then, give the same incentive as the dimout restriction to post-war buying. However, if certain daytime lighting is stigmatized as unessential what effect will that have on sales in that field? Its essentiality will be determined by the rapidity with which it is restored.

A—COMMERCIAL

What Part of the Commercial Market Appears to Offer the Greatest Immediate Possibilities?

The answer pretty generally is the relighting of small stores. Campaigns will be built to crack this market just as soon as the war is over and restrictions on the use of materials for civilians are lifted. In addition are markets for window lighting in dimout areas, gasoline service stations when rationing is lifted, return of thousands of new stores forced out of business by war shortages. If the war lasts another year, the mortality in small retail light and power customers will have exceeded a quarter of a million in number.

The larger stores will also offer an active market. Many have already made tentative plans for remodeling. It is reported that chains particularly are active in this direction.

Because of the changing about that is bound to occur when we return to a peace economy, there should be a big market in office relighting.

Are Any Store Merchandising Changes Contemplated that Would Affect Lightning?

That question was asked but the answers gave no indication of anything at this time. Store managers ask that the lighting do not compete with the merchandise. If possible, veiling of the source will be desired. More light is wanted, but dissatisfaction is expressed over the fading effect fluorescent has on certain wares. The use of fluorescent in display cases is expected to increase, but here there is a demand also for smaller overall size. If the safety feature can be satisfactorily settled perhaps this is a place where cold cathode would shine. More esthetic effects, greater use of color and decoration to attract customers can be expected.

B—INDUSTRIAL

Will Industrial Lighting Go Into a Tailspin?

Feeling among the trade is somewhat mixed on this question. There are those who feel that industrial demand for lighting will be non-existent for some time after the war due to the degree to which it advanced during the war. Others take the opposite stand, but for the very same reason. We fall in with the latter group. There are millions of workers who will change jobs after the war and will be dissatisfied with poorer lighting than that under which they worked during the war. Then there are the plants that for one reason or another were unable to relight during the war. The rehabilitation of manufacturing plant will by nomeans be confined to reconverted war plant. And finally there is the question of competition. Lighting has been given credit for a share in the job of speeding up war production. Certainly all of the important war plants had the best and latest in lighting. Others after the war who will have to compete with them will want equally good lighting.

Will Dismantled War Plants Flood Market With Used Equipment?

In the absence of any plans to dispose of war-used materials it is pure speculation to take any position on this question, although both sides have takers at the moment. Perhaps the best answer will be found in the experience following the last war. One thing certain, this dismantling, however much or little there is of it, cannot come until some time after the war, so if there is any volume of used equipment dumped on the market it shouldn't affect the immediate post-war market.

Will Modern War Plants Need Any Relighting?

From the standpoint of lighting alone the greater percentage of these plants would probably need no change. However, because they were to be around-the-clock operations throughout and since it would save circuit copper, these plants were designed for little or no local circuit control. Under peace conditions the saving in light might soon offset the cost of rewiring, so considerable of this may be expected. Then, of course, there are the plants that were thrown together so hastily that good engineering was not used. Lighting equipment of the stripped kind necessitated by limitation orders will be replaced in some degree.

One interesting point of view is that in some instances a plant survey after the war may show that it would be cheaper in maintenance to replace existing small units with a smaller number of 3-kw. mercury units.

C—RESIDENTIAL

What Are the Immediate Post-War Possibilities?

There are some indications of a relighting market using fluorescent. There may be some kitchen and bathroom relighting campaigns. The big market, as usual, will be new construction. This is estimated to exceed a million new residences a year for several years, mostly in the less than $6,000 class.

What Will Be the Effect of Pre-Fabrication?

In the absence of well-thought-out distribution plans there is no way of getting any very reliable estimates of the volume of post-war pre-fabricated homes. In addition to the distribution, it is going to be necessary to find the answer to the labor problem. What position will the building trade take? Certainly the most strenuous effort will be made to market the ready-made home, which, it is to be expected, will include modern lighting.

The government and war housing units are not necessarily any indication of the design of the pre-fabricated home of tomorrow with relation to the lighting. Will it be built-in? Or will it follow the past? Since price is the important marketing feature, it is possible that the built-in feature may have to wait.

On the other hand, many of this type of house are designed around the built-in idea for everything including furniture. In those houses built-in lighting may be expected to lead the way for future design in other housing.

Will Fluorescent Be Used in Homes Generally?

It is available at the moment to the kitchen and bathroom but not to the

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"Where Quality is a Responsibility and Fair Dealing an Obligation"

same degree for the rest of the house. There seems to be no question, however, about the ultimate use of fluorescent throughout the home, showing up first in concealed lighting in new homes. Replacement of tubes and maintenance will require a wide educational program if and when fluorescent is widely used.

Will Fixtures Return to Homes?

Because fluorescent is a lower brightness source there is reason to believe that ceiling fixtures may return if they can be made attractive. This is not going to be easy, especially if enough light is provided. The trend toward built-in lighting, however, is expected to prevail, at least with the more expensive homes.

Brackets may possibly return in the form of low-brightness panels, which may serve also as sources of radiant heat.

Will Use of Portables Decline?

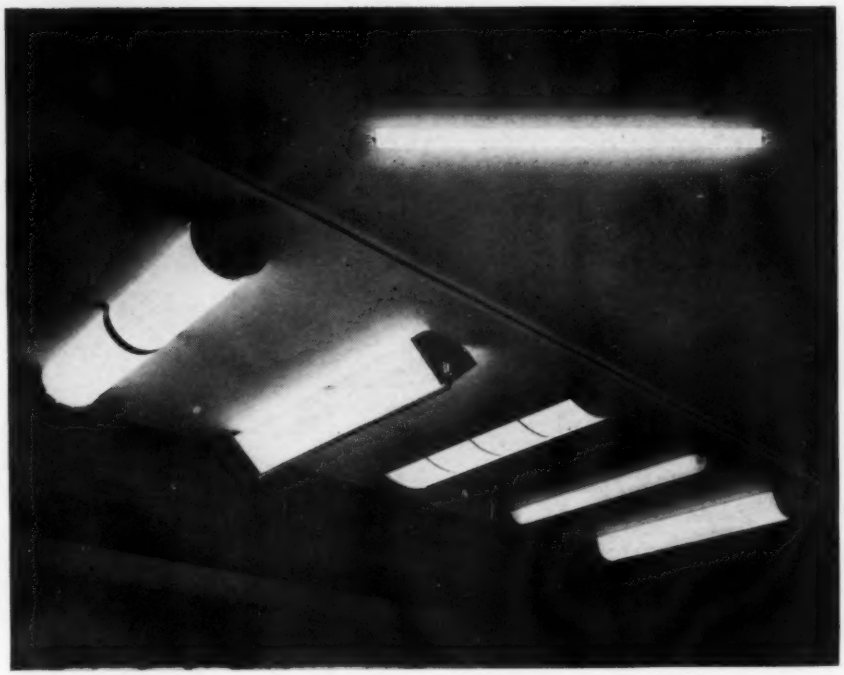
The old home as now will be very largely dependent on portables. The immediate new home likewise, but when fluorescent is built in and luminous ceilings are used there is every reason to believe that portables will function more as decoration than as needed reading lamps. And if the fluorescent is introduced into the old home properly the market for the portable is apt to suffer further.

Will Fluorescent Be Used for Portables?

There are some fluorescent portables now, but for the most part these are merely adaptations of incandescent styles. They have not proved very popular. Designers are now giving attention to coils, but these are clumsy with the hot-cathode tube, especially if enough lumens are designed into the lamp. The cold cathode, of course, would be ideal for this application were it not for the fact that the introduction of thousands of volts into a portable lamp would probably never be permitted by the inspection authorities. It will be some time, if ever, before that is worked out in a manner that is acceptable to the sponsors of the National Electrical Code. Someone, however, will find a way to use hot-cathode tubes in a simple attractive lamp of a unique design that will make it acceptable to interior decorators and housewives.

Any Changes Seen in the I.E.S. Lamp?

There is a strong demand for a more attractive design. The suggestion has also been made that it be extended to include fluorescent portables.



Before Pearl Harbor designers were well on their way toward terminating fluorescent's bare-bulb era by offering attractive glass fixtures that would make fluorescent lighting part of the building's decorative scheme. Further development of these glass fixtures may be seen very soon now that the WPB has permitted manufacturers to resume production of commercial fixtures after December 1st. The bare bulb is seen above in contrast to a display of some recent glass fixture ideas.

What About Radio Interference?

If fluorescent tubes are introduced into the home it will be necessary for them to be carefully installed and shielded against radio interference. With the advent of television after the war, it will be more necessary than ever to keep down man-made static.

Are Any Lighting Design Changes Contemplated?

Progressively home architecture is expected to be more and more functional and all elements built in will be for that purpose. The lighting will be treated in this manner, which is but another indication of the trend toward in-built luminous ceilings.

Where more light is needed, such as in certain corners, that might be used for reading, concealed down spots are suggested. Control of luminous ceilings or coves to provide higher or lower levels depending on occasion is being discussed.

D—STREET LIGHTING

What Is the Outlook?

Lighting of city streets and approach roads, intersections and danger spots should provide an active market after the war. Lighting of highways, except within cities, and rural roads do not appear to offer the same promise. The safety angle of street lighting is beginning to make a dent in official consciousness and already a number of municipalities are making plans to improve the night-driving seeing conditions on their streets. The cost of adequate lighting is cited by state traffic officials as holding highway lighting back. Dependence along the open road, they claim, will be placed on better headlights and reflectors for curves and signals.

Will We Have a Return to White Way?

Street lighting of the future will follow the trend started long before the war, namely, utilitarian. Even in the downtown business sections it would not be surprising to see the ornamental give way to strictly functional.

What Source Will Be Used?

More and more interest is being expressed in fluorescent and less and less in sodium. Mercury and mercury mixed with incandescent appear to be strongest.

The most definite opinion is expressed on sodium. Some people like it and see a future for it as a general street and highway lighting source. Most people, however, are of the opinion its use should be confined to danger zones. Because of its distinctive color it is held to be best used as a warning.

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tersections, bridges and especially bad curves are the types of locations that would be reserved for sodium.

The fluorescent interest is mixed. It was emphasized that in spite of the interest fluorescent equipment will have to be greatly improved before it can make much headway for street lighting.

E—OUTDOOR LIGHTING

The market for sports appears particularly promising. Building exterior floodlighting is viewed optimistically.

What About Air Fields?

The expansion in commercial and passenger flying is expected to be reflected in a larger number of airports, which will call for large increase in demand for marking lights, beacons, floodlights, etc. If the helicopter becomes commonplace, a major market is seen for landing lights for private fields in residential areas. The suggestion has been made that highways have emergency landing strips properly marked.

SALES PROGRAM

THERE are so many elements not present in the pre-war selling that it would appear advisable to start anew in programming for post-war. The competition is expected to be strong and for that reason a real program is needed.

Is Any Preparation Needed?

It will be found advisable to have ready for V-day an analysis of all industrial lighting load, especially war industry, so as to be ready for reconversion. Other lists of prospects should be compiled from those that have tried unsuccessfully to improve their lighting during the war. Promotion aimed at V-day is, of course, obvious.

What Customer Education Is Needed?

It is well to assume that customers still understand little or nothing about what constitutes good lighting or what it can do. Especially is this true of the industrial customer. Even architects are far from being sold on good lighting.

In connection with industrials, an I.E.S. film, about to be shot, should be available before the end of the year.

How Much Will Be New and How Much Relighting?

There are no data on which any such division of the market could be made. It is our opinion, however, that the relighting market will be much the larger. This is based upon the necessity for virtually relighting the entire country. One authority estimated 75 percent of commercial lighting was obsolete. Even if that figure were no higher, the rest of the installations will be obsolete long before we can get around to them. And even those we relight right after the war will be out-of-date before we can complete the relighting of all the rest of America. The size of the market, therefore, is limited only by our ability to sell it and to serve it.

TRAINING AND EDUCATION

A FILAMENT lamp application was simple in comparison with using the light sources we now have to work with. Its limitations were known and there wasn't much that we could do except what always had been done. Even then many mistakes were made. Are we going to be content to make mistakes, or are we going to recognize the insufficient training of the men we are sending out to contact the public in what promises to be the biggest wave of relighting the country has ever known?

The I.E.S. has developed recommended practices for a large number of occupancies. Research organizations have worked up scientific data. Are these only for use by the experts, of which the number is small, or are they for widespread areas? Are we going to be satisfied to let competition rule the job, or are we going to use the information that has been gathered for the very purpose of helping the industry better serve the lighting customer? Prior to post-war we should see the answers to some of these questions in a well-balanced educational course widely available.

Is Need for Training Seen?

Due to the increasing complexity of lighting problems as the result of the new light sources and demand for improved quality, as well as to the threat of cheap competition, there is a growing awareness of the need for better trained lighting salespeople. There is every reason to believe that courses or outlines of courses will be developed to take care of this need. These courses will also provide the necessary brush-up for the men returning from the war.

In addition there is a growing need which will become insistent after the war for more qualified illuminating engineers. Much of the new work in more costly buildings will require special handling of the lighting, although the equipment may be standard.

If the planning is to be done in the blue-print stage instead of waiting until the building is complete, trained men are needed who can visualize the right coordination.

Is Anything Being Done So Far?

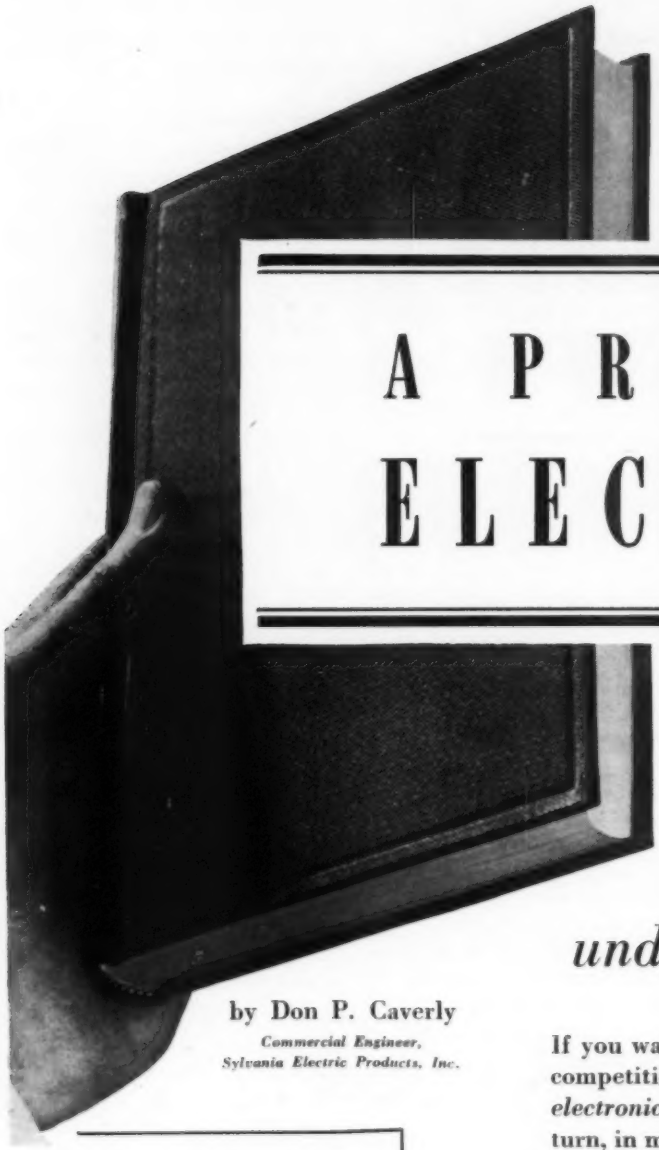
Local power companies are giving some thought to refresher courses not only for their own men, but for the salesmen of local dealers and others. A national program is in the discussion stage and the Illuminating Engineering Society has already committed itself to the preparation of a lighting handbook.

What Kind of Training Is Needed?

It must be simple and practical and include a thorough grounding on quality and how to get it, a knowledge of accepted industry standards and recommendations and an understanding of the characteristics of tubes and accessories. With it, of course, will go training in the use of modern instruments which are putting more exact qualitative engineering into lighting design.

CONCLUSION

The market possibilities look splendid. The equipment manufacturers should be ready as soon as the market. The public is in the most receptive frame of mind ever. Now is the time to prepare. Now is the time to educate the salespeople in the elements of good lighting. Now is the time to make plans, so that when the war is ended we will know what to do and be prepared to do it.



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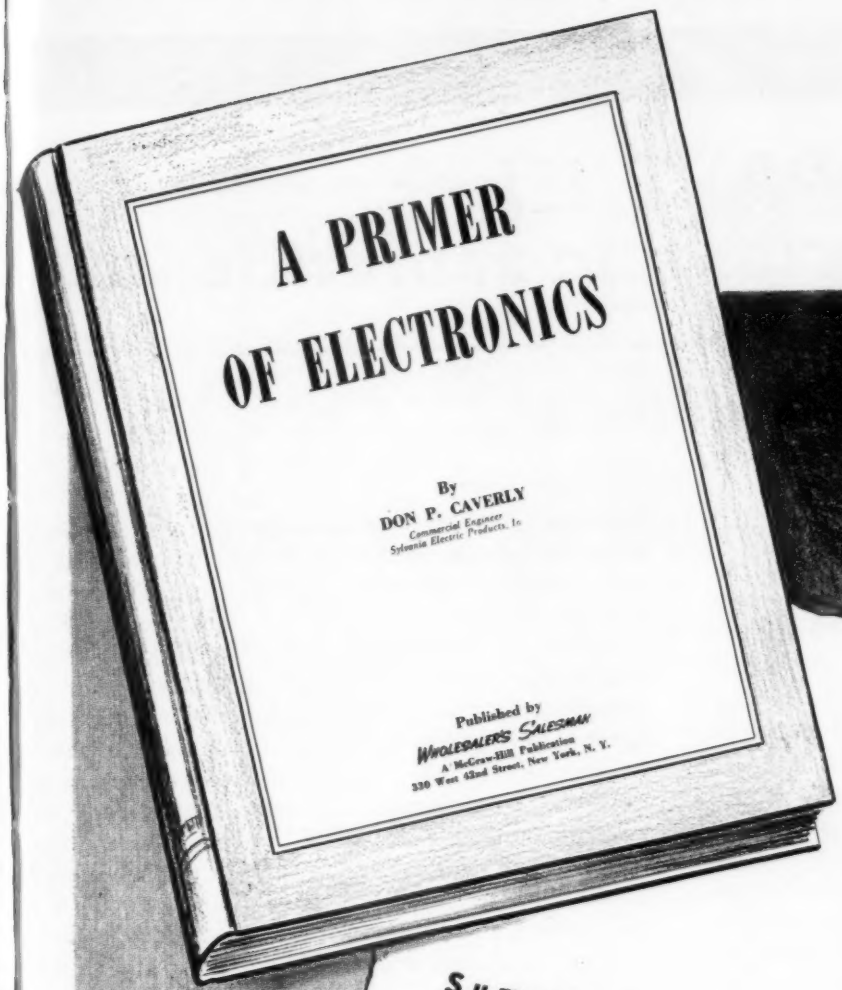


IN THIS ISSUE

PART III

Electromagnetic Radiation

(Continued)

Chapters 8, 9 and 10

Summary of Preceding Chapters

PART I. ELECTRIC CURRENT—AS PUBLISHED IN AUGUST, 1943

CHAPTER 1, covers the structure of the atom, natural electrical phenomena, electric current flow and units of measurement.

CHAPTER 2, deals with electrical conductors and their effect on current flow. Explains potential and kinetic energy.

PART II. MAGNETISM—AS PUBLISHED IN SEPTEMBER, 1943

CHAPTER 3, covers the basic principles of magnetic force, generation of electric power, both alternating and direct current.

CHAPTER 4, deals with the principle of mutual inductance, also capacitance and inductance. Also explains power factor.

CHAPTER 5, discusses such terms as "inductive reactance," "capacitive reactance," and "total reactance"—also resonance and harmonics.

PART III. ELECTROMAGNETIC RADIATION—AS PUBLISHED IN OCTOBER, 1943

CHAPTER 6, covers various types of waves, transmittal of sound waves, and the passage of electromagnetic waves through the ether spectrum.

CHAPTER 7, explains the nature of light, its generation, control by reflection and refraction, and units of measurement.

(This work will be available complete in book form at $2.00 per copy. For large quantities, prices on request.)

PART III
ELECTROMAGNETIC RADIATION (Continued)

Chapter 8

Infra-Red

If reference is made to the diagram of the range of electromagnetic radiation*, we find a rather wide band of wavelengths between the limits of about 7800 and 1,500,000 Angstrom units called Infra-Red radiation. The frequencies of these electromagnetic waves range from about 400 billion to somewhere around 700 or 800 million kilocycles.

As previously mentioned, wavelengths longer than deep red (at 7800 A) we cannot see, but we do feel them as radiant heat. It is not quite correct to refer to infra-red radiation only as heat radiation, however, because all wavelengths of radiant energy generate some heat when they are absorbed. But since infra-red energy does little else but produce the sensation of heat, as far as we know at present, it is always closely associated with it.

Heat is a relative term. A red hot stove is cool when compared to molten steel. An ice cube is warm as compared to carbon dioxide snow (dry ice), and carbon dioxide snow (at −78°C) is warm as compared to other liquefied gases. All matter, therefore, radiates heat or infra-red radiation at some wavelengths whenever the surrounding medium is cooler. When the medium is warmer, it absorbs heat from the medium. Thus we see that nature is again trying to seek a balance, just as with the discharge of electrons from a charged object to one which is more nearly in an electrically neutral state.

It is interesting to recall and associate two facts that have been pointed out: that the movement of electrons in a solid is stimulated by heat, and that absolute zero (−273°C) is a condition wherein *no* heat exists and all molecular motion ceases. This condition and temperature (or rather lack of it) is believed to exist in outer space where there is no matter in any form to absorb any of the electromagnetic waves.

The infra-red band is usually split into two regions for the sake of analysis. The region adjacent to visible light extends from the 7800 A. wavelength to about the 28,000 A. wavelength and is called "near" infra-red. Almost all of the practical applications of infra-red radiation utilize wavelengths in the near region, so most of what will be discussed here will deal with those shorter wavelengths. The other portion of the infra-red band is called "far" infra-red. The shorter wavelengths of this "far" portion, that is, those above 28,000 but below about 50,000 A. are produced by ordinary ovens at around 300°F. Uses for the longer ones ranging between 50,000 and about 1,500,000 A. are being developed and as yet have no widespread application.

Near infra-red energy for commercial and industrial use usually is produced by incandescent lamps so designed that some of their visible light output is sacrificed in order that the infra-red radiations will be produced with greater efficiency. Another efficient method utilizes gas-fired infra-red units called gas radiants. Like other wavelengths of electromagnetic radiation, infra-red waves travel through space at the 186,000 mile per second speed until they strike a surface where they are absorbed and heat is generated in the material they strike. Most non-reflective substances will absorb and convert into heat a large percentage of the radiant infra-red energy striking them, whereas reflecting surfaces redirect and control it the same as visible light waves are reflected and controlled.

The heat energy thus absorbed by a substance, such as iron, will be transferred from one iron atom to another until within a short time the whole body of the object is warm even though the infra-red radiation is only falling upon a part of it. This transfer of heat within the object itself is called *conduction*. The most familiar example of conduction is found in a steel rod or poker. The handle can become unbearably hot, even though only the opposite end is thrust in the fire. Some materials conduct heat much less rapidly than others which explains why wooden handles are placed on the metal pots and pans used on

the kitchen stove, and why aluminum, being an excellent conductor of heat, makes highly satisfactory cooking utensils.

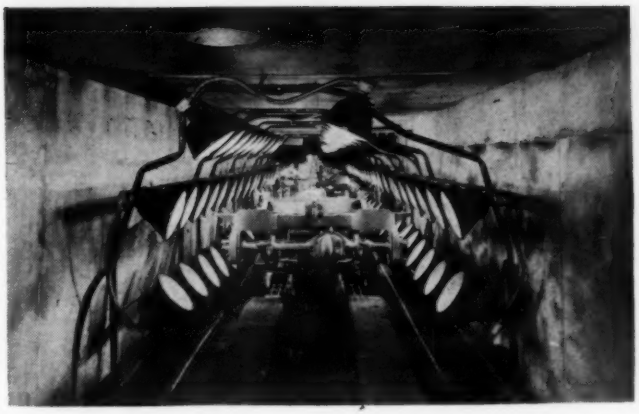
When an object is hot, or even warm, it radiates its heat into the cooler air until it eventually reaches the temperature of the air. In so doing, the surrounding air absorbs the heat energy and if air circulation exists, this warmer air around the hot object rises and circulates away. This type of heat transfer is called *convection.*

All three types are present in heating the average home. Combustion of the coal, oil or gas fuel produces radiant heat (infra-red energy) which is absorbed by the boiler pipes and transferred to the water in them by conduction. This hot water is circulated through the radiators so that they become warm and heat the air surrounding them. Normal air circulation within the rooms carries this warm air about so that the heat is transferred by convection and the house is warm and comfortable. A fireplace is a good example of infra-red radiation at home. While some air is heated and circulated through the house, we must sit before the fire to really feel its heat. The same is true with electric sun-bowls which are quite widely used for "spot" heating.

Aside from providing heat to make us comfortable, infra-red is put to work in many industrial processes. These include paint and enamel drying, baking, preheating and dehydrating.

Basically these processes are the same. Banks of incandescent lamps are used, each lamp being equipped with its own reflector. The reflector can be applied as an "aluminized" surface to the glass bulb itself, or as a separate element in back of a lamp. Gold plated steel reflectors, while they are not as efficient as other surfaces for visible light, do reflect the greatest amounts of useful infra-red, and are used extensively in industry. Such reflectors control the infra-red flux the same as those used for visible light. An opaque object placed in the "beam" of radiant heat will cast an invisible "shadow" by absorbing the radiations that strike it.

The one pronounced advantage of using radiant infra-red energy for drying paints, lacquers and similar finishes, or for dehydrating and baking materials, is the reduction in time involved to accomplish the task. Near infra-red radiation is penetrating, that is, the heat is absorbed *within* the object being treated so that a film of paint tends to dry from the inside out, rather than from the surface inward as with oven drying or baking. Processes that formerly required as much as 15 or 20 hours normal drying time are frequently



This infra-red oven bakes the prime and finish coats of paint on Army Jeeps. It takes 9 minutes for this method compared with 45 minutes which it took previously in a convection oven. (Photo courtesy C. M. Hall Lamp Company)

completed with infra-red in a matter of 15 or 20 minutes. Others may require no more than one or two minutes as compared to over an hour with oven drying.

Obviously there can be no established drying time rule to cover all applications. Different materials such as iron and wood have different heat conducting characteristics as was pointed out a moment ago with the mention of wooden handles on kitchenware. In addition, the types of finishes to be dried or baked vary widely in their composition, so that more time will be required for some than for others. The color of a finish also affects its drying time. Light finishes usually take longer to dry thoroughly because some of the infra-red will be reflected; whereas darker paints or lacquers dry more rapidly by virtue of more rapid infra-red absorption. The same time differences occur in dehydrating operations. A hard wet surface of metal can be dried more quickly, for example, than a wet rug or a water-soaked piece of wood, but in either case the drying time would be less than with heated air as the only drying medium.

Radiant heat requires no air for its transmission and the air present between an infra-red source and the object is heated only to a comparatively negligible extent. Thus, with infra-red radiant drying it is not necessary to exclude air circulation or to provide insulation to keep the heat "in."

These factors result in speed and economy in a great many processes. It is apparent that the technique of utilizing these wavelengths of electromagnetic radiation is just crossing the threshold of a much wider range of industrial application than is generally appreciated.

Infra-red radiation also serves in the field of

medicine. The sun, producing more than an abundance of infra-red, has been considered and recognized as a great healing agency since the dawn of civilization. The same radiations produced artificially in therapeutic lamps have the characteristic penetrating powers so that heat is generated deep in the body tissues beneath the skin. Bruised and strained muscles and ligaments can be relaxed and soothed with a consequent decrease in pain with infra-red therapeutic application. Lamps and reflectors for this purpose are found in all gymnasiums and doctors' offices where athletic injuries are treated. Such treatment is sometimes referred to as "deep therapy" to distinguish it from heat treatment of surface abrasions.

There is evidence which indicates that visible light of different colors possesses a healing or tonic effect upon the human system—that blue or green light, for instance, has definite curative powers for some ailments while red light will produce healing results for others. It is quite likely, however, that such effects, where evident, are largely psychological rather than physiological, since the nervous reaction to color is very pronounced in most individuals.

The use of infra-red radiation in photography has made it possible to extend that art beyond the limits of vision. Objects can be photographed in absolute darkness or through a haze which makes them visually obscure.

It has been explained that we see an object by virtue of the visible light it reflects, and that most objects reflect infra-red as well as light, but that infra-red is beyond the limit of eye sensitivity. A camera, however, equipped with film sensitized to infra-red radiations by means of special emulsions, will capture objects or landscapes which the eye cannot see. Thus an object in the kitchen can be photographed at night and without light, merely by heat from a stove which is not even red hot.

Since infra-red possesses far greater penetrating powers than visible light, and since all objects reflect infra-red, it is possible to photograph landscapes through a haze so thick that they cannot be seen. After considerable research work, film has been developed which is sensitive to infra-red radiation as long as 12,000 A. in wavelength. If used in the daytime, special lens filters, which are opaque to visible light but not to infra-red, must be placed over the lens.

Black and white photographic prints from an infra-red film have a somewhat unusual reversed appearance due to reflection factors of objects which are different for infra-red than for visible light. A blue sky or lake, for instance, will appear quite dark whereas, red, green or yellow objects will show up much lighter than in a regular photo.

The infra-red region in the range of electromagnetic waves, particularly the longer wavelengths of the "far" portion is just beginning to be investigated, and developments during the next few years should be of great interest and benefit to everyone.

Chapter 9

Ultra Violet

Beyond the violet limit of the visible light band in the diagram of the range of electromagnetic waves*, and in the opposite direction from infra-red, the radiations are called ultra violet. The lower or long wavelength limit of the ultra violet band is established at about 4000 A., or where visual color sensation ceases, but the upper or short wavelength extreme is somewhat indefinite. It is generally considered as around 100 A., which is a decided overlap with another band known as X-Rays. (These will be discussed later.) The frequencies of ultra violet radiations are, of course, higher than either those of infra-red or visible light since the wavelengths are much shorter. These vibrations range from 8 or 9 hundred billion per second to somewhere in the order of 20 or 30 trillion per second—an almost inconceivable frequency, but still not as high as others to be considered.

Like infra-red, the ultra violet region is split into "near" and "far" portions for the sake of analysis, the "near" being adjacent to the violet end of the light spectrum, and the "far" encompassing the shorter wavelengths. Sometimes a "middle" portion extending between 2000 and 3000 A. is referred to in textbooks, but since the limits are more or less arbitrary, we can, for the sake of simplicity here, avoid the "middle" desig-

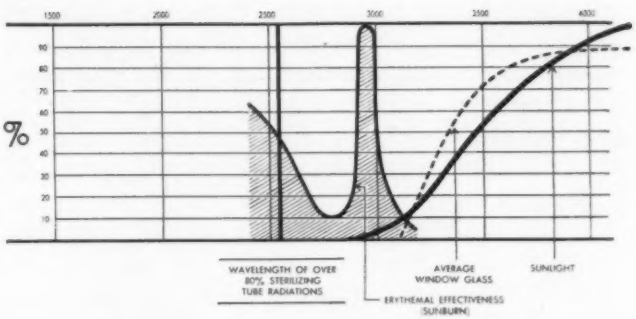
nation and consider the border between "near" and "far" ultra violet as being at the 2000 A. wavelength. With this borderline established, most of our discussion will involve the "near" portion, or wavelengths between visible violet light (4000 A.) and ultra violet (at 2000 A).

As with visible light and infra-red, nature's most abundant source of ultra violet is the sun. Although the sun radiates a great amount of ultra violet energy into space, only a relatively small amount of it (the longer wavelengths) reaches the earth. The atmosphere filters out or absorbs nearly all the radiation of a wavelength shorter than 3000 A. This is indeed fortunate because these shorter wavelengths, even in amounts much less than the longer wavelength energy which we do receive, would cause burns and injuries so severe that life could not exist,—at least in the open.

Careful study and analysis of the sun's spectrum indicates that its temperature is around 10 or 12 thousand degrees Fahrenheit and that its maximum energy is radiated in the visible region at a wavelength of about 4700 A. At the earth's surface from 1 to 5 percent of the energy is ultra violet between 3000 and 4000 A., from 41 to 45 percent is visible light, and from 52 to 60 percent is infra-red. This is with the sun at average height in the sky under average seasonal conditions. As the afternoon passes and the sun sinks lower, the energy is absorbed to greater extents by the increases in the thickness of air through which it must pass. Obviously, the reverse takes place during the forenoon hours as the sun approaches the zenith.

It has also been found that while the noonday summer sun is only 10 percent more potent in infra-red radiation than in winter, it is about 1000 percent richer in ultra violet in summer. In view of this, it can be seen that between these two extremes the additional visible light energy in the summertime will become increasingly greater for each successive color from red to violet.

Everyone has experienced a severe sunburn after being exposed to the mid-summer sun. The physiology of sunburn (erythema) is somewhat complicated for a complete discussion here, since it involves a study of several layers of skin, various parts of the body, and subjects having different complexions. In general, blonds will sunburn more rapidly than brunettes, and, as a rule, the nature of the latter's skin is such that they "tan" more readily than blondes. Wavelengths between 3000 and 3200 A. will penetrate the skin deep



The curve indicated by the shaded area shows the region of sunburning radiations in the ultra violet spectrum. The maximum effect is found at 2970 Angstrom units.

enough to reach the pigment producing cells and cause a tan, but those between 2800 and 3000 A. merely burn with but very little tanning effect.

While sunburn (tanning and burning) is produced by ultra violet radiation between the wavelengths of 2800 and 3200 A., the maximum effect is at about 2970 A. (in nature). It will be recalled that very little ultra violet energy shorter than 3000 A. reaches the surface of the earth due to atmospheric absorption, but it should be remembered also that the sun is an abundant producer of all wavelengths so that those longer than 3000 A. which penetrate the atmosphere are amply potent to cause severe and painful burns with sufficient exposure time. In other words, if the air were thinner, as at very high altitudes, so that the maximum sunburning wavelengths around 2970 A., could pass through, we would suffer terrific burns in a matter of a very few minutes.

Unlike infra-red, ultra violet is not penetrating as compared to other wavelengths of electromagnetic radiation. We do not become sunburned while sitting by a closed window because the rays will not pass through ordinary window glass. There are certain types of glasses, however, which are specially made to permit the transmission of ultra violet. One such glass, called Corex, is used in certain types of ultra violet "sunlamp" bulbs, and transmits wavelengths as short as 2900 A. Certain other materials, such as cellophane and sodium silicate (water glass), also transmit ultra violet in amounts depending upon their thickness. Special glasses, to allow much shorter wavelengths (2000 A.) to pass through, will be discussed shortly.

Ultra violet radiant energy behaves to a large extent like visible light and infra-red. It has just been indicated how it is transmitted by some

glasses and other materials. These materials also refract ultra violet as they do light, and since quartz has a high transmission factor for ultra violet, quartz prisms are frequently used for the purpose of wavelength study. Ultra violet is also reflected by various surfaces, the most efficient ones being metallic.

There are a great many more phenomena connected with ultra violet radiation than can be covered here, but we can discuss the most important ones. These phenomena occur at different wavelengths. In nature, where ultra violet is practically all above the 3000 A. wavelength, the sunburning effect is the most prominent and has already been briefly covered. Below 3000 A. we must deal with radiations produced artificially since they are not present in solar energy reaching the earth.

Ultra violet radiation is produced by some materials when they are heated to brilliant incandescence. Today, such heating is accomplished electrically, but a hundred years or so ago it was done chemically with an oxyhydrogen flame and a piece of rare-earth oxide or lime. Such a device was called a limelight, or sometimes a calcium light, and was used to illuminate theatrical stages since it produced visible light of high brilliancy as well as relatively long wavelength ultra violet radiations.

Although such sources have the advantage of burning without an enclosure in the open air, they are cumbersome for commercial application and are not rich enough in ultra violet to be of practical use.

A high voltage electric spark or an arc between metallic electrodes, such as iron or carbon, is also a producer of ultra violet in the open air, but mercury vapor arcs created in an inert gas such as argon are widely used at present for the commercial generation of ultra violet. Of course, such mercury vapor discharges must be confined within a sealed glass or quartz envelope.

It has been explained how ordinary window glass will not transmit any except the very long wavelengths of ultra violet adjacent to the visible light region, so that although the discharge itself may be extremely rich in ultra violet, the potency of the source is wholly dependent upon the transmission characteristics of the glass envelope.

Quartz is perhaps the least opaque to ultra violet of any commercially available substance, and will transmit radiations having wavelengths as short as 1850 Angstroms, depending upon its thickness. As that approximate limit is approached the oxygen in the air itself undergoes certain chemical changes, and the production of ozone which results from the absorption of "far" ultra violet radiations by the air creates an envelope of ozone around the source through which short radiations cannot pass. The sun, radiating ultra violet of all wavelengths creates a protective layer of ozone high above the surface of the earth in the outer limits of the atmosphere, thereby absorbing the short, harmful rays.

In the laboratories, equipment is used which permits the study of extremely short wave ultra violet. This equipment utilizes fluorite and other substances which allow far greater transmission of short wave ultra violet than quartz. For several years there remained an unexplored gap between the shortest ultra violet radiation and the longest x-rays, but comparatively recently this region has been penetrated to the extent that ultra violet and x-rays are found to overlap at their respective extremes. This is indicated in the diagram of the range of electromagnetic waves.

Below the quartz transmission limit of about 1850 Angstroms, we have no interest in this discussion of ultra violet since the "far" or "extreme" region has little commercial application at present. Future development, in the technique of generation and control, will, no doubt, bring many benefits to mankind in the fields of surgery, bacteriology and medicine.

In the "near" region of ultra violet radiation, however, particularly that portion sometimes referred to as "middle" ultra violet between 2000 and 3000 Angstroms in wavelength, great progress has been made during the past few years. Much of this progress is due to Corning Glass Works' development of glasses which pass ultra violet at different wavelengths. Many of these glasses can be looked upon as "protective" glasses since they transmit those wavelengths desired and shield out the shorter ones which are damaging to the eyes. Some of them, however, must be used with extreme care since they are deliberately designed to transmit short wavelengths for bactericidal and other purposes.

Quartz lamps, lamps made of glass transmitting wavelengths shorter than 3000 Angstroms, and open arcs such as are used in welding, will cause serious damage to the eyes and skin unless they are properly shielded. The skin injury is an inflammation similar to sunburn, and the eye injury is an inflammation of the conjuctiva—a mucous membrane covering part of the eyeball as well as the inside of the lids. Conjunctivitis, as the

inflammation is called, is usually indicated by the feeling that the eyes are full of sand and the lids stuck together. It is frequently quite painful and may be of several hours duration. Prompt treatment by a physician may avoid permanent damage, and in extreme cases even blindness.

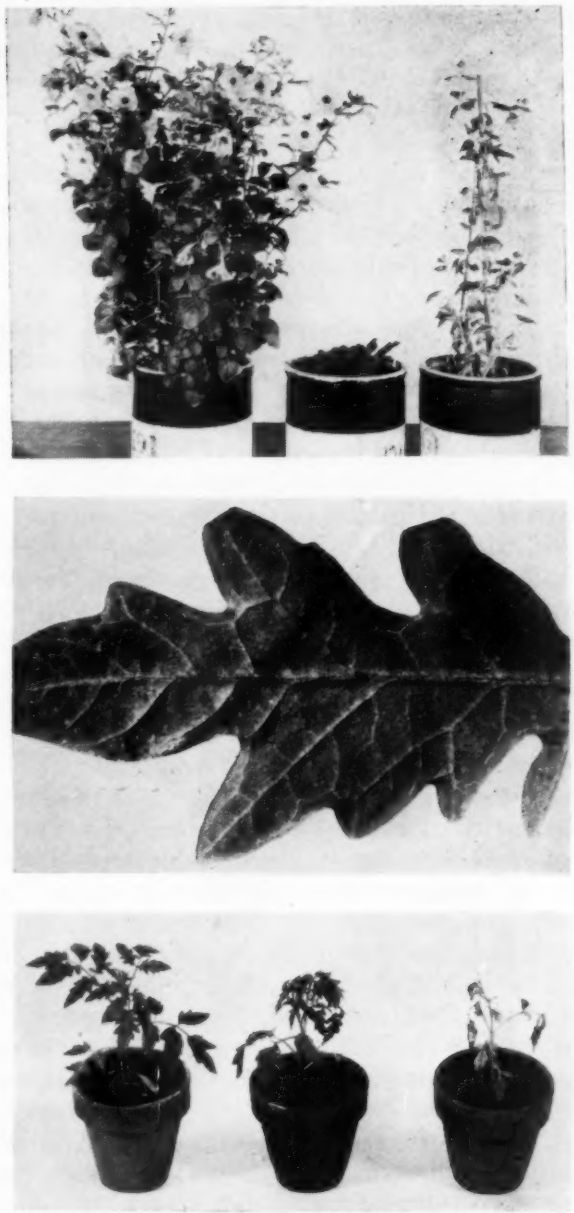
There are a great many physiological effects of ultra violet energy besides those on the skin which are evidenced by sunburn and tanning (erythema), although "sun bath" treatments (heliotherapy) are looked upon as the major function of ultra violet. Of recent years, however, the general public seems to have acquired some respect for ultra violet and has avoided excessive exposure to the hot summer sun.

Ultra violet penetrating the thin outer layers of skin is absorbed by the blood stream and enables it to accumulate more phosphorus and calcium. These two elements are essential for the building and maintenance of sound bones and teeth, and consequently result in the avoidance or cure of a bone disease called rickets. Vitamin D, which is abundantly present in fish-liver oil and milk, aids in the same purpose and is frequently referred to as "the Sunshine Vitamin".

The healing of some types of skin diseases has been found to be hastened by ultra violet radiation. If the disease is of such a nature that deeper wounds exist, it is probable that infra red, which is of course more penetrating than ultra violet, may be more effective if used in conjunction with the ultra violet. In natural sunlight exposure the increased blood circulation and toning effect of the infra-red is present along with the bactericidal and cauterizing action of the ultra violet.

Extensive analysis of the action of certain wavelengths of ultra violet has been carried on by several investigators. The published works of Dr. Henry Laurens and of Ellis and Wells are particularly complete and cover a great many effects on the blood, skin, circulatory system, metabolism, respiration, heart beat and human diseases. In general, it can be said that ultra violet radiation of wavelengths no shorter than found in nature can be beneficial and curative in moderate amounts, and that a lack of sufficient radiation can be at least partially made up with a diet properly regulated to include the necessary additional Vitamin D and A components.

The effective wavelength for the production of calcium and phosphorus in the system is in the region of 3020 Angstroms. Since the effect is on the blood stream, it is obvious that irradiation of



In the top photo: three petunia plants—the one on the left had been exposed to the natural complete spectrum of sunlight; the center one received only the violet and blue light (the longer wavelengths were filtered out); the plant at the right received only infra-red, red, orange and yellow light from the sun. The center photo shows a normal healthy leaf, diagonally across which a band of 2650 A. wavelength ultra violet from a mercury arc was cast for a few hours. This wavelength of ultra violet was separated out of the spectrum with quartz prisms. The dark band across the leaf shows the killing or injuring of the epidermal layer of cells on the leaf where they were exposed to such a short wavelength of ultra violet. In the bottom photo are three tomato plants. The one at the left is the normal control plant. The center one was taken from the greenhouse and exposed to a mercury vapor arc in quartz for three minutes. The plant at the right was deprived of all light for four days.

(Photographs and data from the Boyce Thompson Institute for Plant Research, Yonkers, N. Y.)

only one part will affect the whole body as the blood circulates through it.

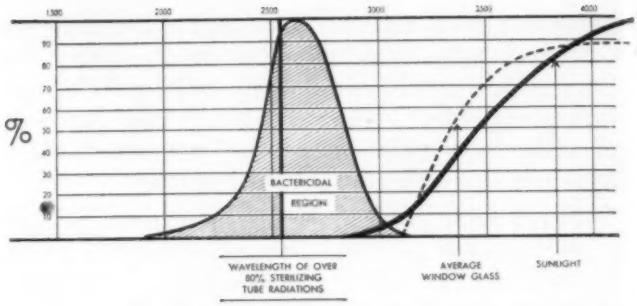
A comparable result can be accomplished through the irradiation of several types of foods instead of the body itself. Irradiated milk is readily available and is perhaps the best known of irradiated foods, although the Vitamin D content of certain cereals, starch foods, and vegetable oils can be appreciably increased through ultra violet irradiation.

Experiments with other vitamins and diseases other than rickets have met with little success. It seems at present that the primary function of ultra violet radiation upon the human system is to assure sound healthy bones and teeth.

Considerable successful work has been done in conjunction with the raising of poultry and the production of eggs. Calcium and phosphorus are vitally important in this industry since they have as much effect upon the egg laying capacity of hens as upon the development of their bones. Incandescent tungsten filament lamps having special ultra violet transmitting glass bulbs have been developed specifically for application to poultry. These lamps are called CX lamps and although the amount of ultra violet produced is relatively small, their consistent use has been a successful means of increasing egg production and improving the health and sturdiness of chickens.

As far as the effect of radiant energy on plants is concerned, considerable investigation reveals that as a rule, plants grow best under light of all wavelengths as found in nature. Excessive amounts of ultra violet (or infra-red) will cause serious damage, although the elimination of solar ultra violet does not result in an appreciable improvement in growth. Plants can be "forced" with light up to certain point after which a leaf injury may appear and increase until the leaves completely wither and drop off. Complete studies on the correlation between radiant energy and plant growth have been carried out at the Boyce Thompson Institute for Plant Research at New York. An accurate generalization covering all plants is difficult because different plants may vary in their response to different wavelengths of visible light, ultra violet and infra-red.

The bactericidal effect of ultra violet has been known for many years but was not commercially applied until a glass with adequate transmission characteristics at this wavelength was developed a few years ago. The sun has long been recognized as a germ killing medium, and practically all types of bacteria can be killed, or at least weak-



The curve enclosing the shaded area indicates the bactericidal region of the ultra violet spectrum. The 2537 A. mercury line falls at the approximate peak of this region.

ened by it if sufficient exposure time is allowed, but since practically no ultra violet radiation of a wavelength shorter than 3000 Angstroms reaches the surface of the earth, it is evident that at least some of this radiation must be bactericidal.

Extensive research shows that while there is a slight bactericidal effect in the extreme lower limits of solar radiation, there is a tremendous bactericidal potency in radiations in the region of 2537 Angstroms— a wavelength not present in solar energy. Obviously, therefore, the sun's bactericidal value lies in the fact that it is a tremendously powerful source of the less potent wavelengths. Of course this is fortunate because, as has been explained, wavelengths shorter than 3000 will seriously damage the skin and eyes.

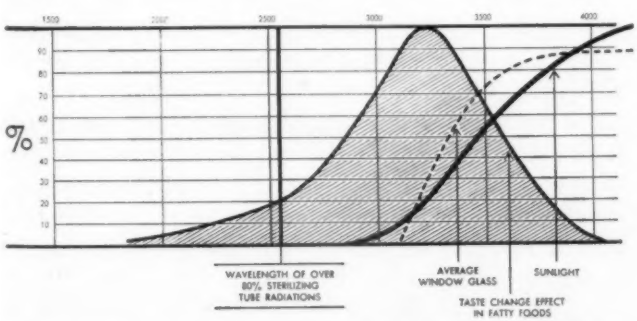
In order to successfully apply bactericidal ultra violet, it is natural that the most potent wavelengths should be employed. Therefore a lamp which is rich in 2537 wavelength ultra violet is necessary. There were a number of difficult problems involved in the development of a lamp which could be applied commercially. While the carbon arc produced an abundance of 2537 wavelength ultra violet, it also produced brilliant light and considerable heat (infra-red), so that it was extremely awkward to handle. Likewise a high voltage disruptive spark presented problems, so that the most likely remaining source was a mercury vapor arc discharge within a glass envelope which would permit the transmission of the 2537 energy through it.

Such a glass was produced a few years ago and today there are several types of sterilizing or bactericidal lamps available for use in hospitals and other locations where sterilization of the air and exposed surfaces is essential. A description of these lamps and their operating characteristics will be presented in Part IV.

In addition to bacteria killing, the 2537 wave-

length ultra violet will arrest the development of many types of molds and fungi by killing the spores of these organisms which float about in the air. The author has conducted several tests with common bread mold and concluded that if properly irradiated bread is enclosed in an air-tight wrapper (which also must be irradiated), it will not become moldy over an extended period. It may become dehydrated and unpalatable, however, the moisture condensing on the inside of the wrapper. These tests were conducted in a large bakery where special ultra violet equipment was applied to irradiate the automatic slicing knives and all surfaces touching the bread as well as the bread itself and its wrapper. Control loaves (not irradiated) showed mold colonies in from three to four days whereas irradiated loaves did not show indications of mold for over twice that period even though the wrappers were not air tight. Since cellophane transmits some amount of ultra violet, several loaves were irradiated after being wrapped in it, but the results of this test could not be considered conclusive. It must be added that mold spores are much more resistant to the lethal effect of ultra violet than are bacteria, and at least one type of mold appears to thrive under it.

There are a great many possible applications for ultra violet irradiation to kill microorganisms, many of which are in successful operation today. There are also many installations of ultra violet sources wherein the actual value is rather dubious. Their use in refrigerators, particularly the large "walk-in" type used for meat storage, appears to have considerable merit from the standpoint of reducing trimming losses by arresting the growth of slime on the surface of meats. In order to avoid an excessive accumulation of such slime, a low humidity is maintained in the refrigerator with a consequent amount of dehydration or drying of the meat surface. This dry and hardened meat must be trimmed off before sale. With ultra violet lamps in operation, however, a higher humidity may be maintained without an excessive formation of slime which results in less dehydrated meat trimming losses.



Curve indicated by shaded area shows the ultra violet wavelengths that cause a taste change in certain foods.

Whenever such foods as milk, butter, and fatty acids are exposed to ultra violet, care must be used to avoid over-exposure, since a taste change occurs which may render these foods extremely unpalatable. This change in taste results from oxidation of proteins as well as the de-emulsification of fats and is not to be confused with the souring of milk or the rancidity of butter. The effect occurs at long wavelengths of ultra violet as well as shorter ones since it can be detected in a sealed bottle of milk left standing for some time in the sunlight. The thickness and type of glass used in the bottle would be such that only very "near" ultra violet in the order of 3700 or 3800 Angstroms in wavelength could be transmitted to the milk itself.

Before leaving the subject of ultra violet radiation it might be well to discuss ozone again, briefly, since as the use of sources producing shorter wavelengths of ultra violet become more common in industry and commerce, the problem of ozone control may reach critical proportions.

Ozone is a rather unstable and active form of oxygen which results when the oxygen atoms which make up an oxygen molecule are torn apart and reformed under unusual conditions. This reforming occurs most often when air, of which oxygen is a large part, is circulated through a high voltage spark gap. Such a spark produces, in addition to visible light, considerable ultra violet, some of which may be shorter than 2000 Angstroms in wavelength. Ultra violet energy, radiating at such short wavelengths also is produced by a mercury vapor arc enclosed in a tube of quartz or special glass designed to transmit it. When these radiations pass through (or attempt to pass through) the oxygen in the air, the tearing apart of the normal oxygen molecules takes place and the ozone is formed. But being active in this form the ozone molecules quickly join together again and revert back to oxygen—particularly if water vapor is present in the air.

Ozone has a characteristically clean odor and is frequently noticed in nature after a nearby stroke of lightning occurs. It may be temporarily stimulating when inhaled but may also cause serious damage to the respiratory system if inhaled for a period of time. The odor of ozone can be

detected if it is present in only a few parts per million of air and even in this quantity may be harmful, so that in laboratories where work with apparatus producing ozone is in operation, precautions are always (or should be) taken to exhaust or absorb it so that workers will not be required to constantly inhale it.

Strangely enough, when methods of generating ozone were first developed a few years ago, its initial stimulating effect was considered beneficial to health, and "ozonators" were placed on the market to deliberately produce it. Now, however, much more is known about its characteristics. It is sometimes used in laundries with special apparatus to impart a clean, fresh and absolutely harmless odor to laundered articles before they are sent back to the owner.

As far as its application to destroy odors is concerned, there is some question as to whether it actually destroys such odors or merely covers them up with its own. Possibly it is a combination of both.

There are many other effects of a chemical and biological nature which occur throughout the entire range of ultra violet waves and frequencies, and the study of volumes entirely devoted to the subject is suggested to those who wish to pursue them further.

Chapter 10

X-Rays

Overlapping with short wavelength ultra violet radiation at one end and long wavelength gamma radiation at the other, we find a region called X-Rays or Roentgen Rays in the diagram of the range of electromagnetic radiation.*

The term x-ray is familiar to the civilized world and there are few of us, in this country at least, who have not been subjected to these radiations by the dentist when he wants to study the roots of our teeth, or by the surgeon who finds it essential to know more about broken bones or organic disorders within our bodies.

The discovery and recognition of x-rays as electromagnetic waves shorter in length than ultra violet, is a rather interesting story. In 1895, a scientist named W. K. Roentgen, while working on a high voltage vacuum tube noticed that some photographic plates enclosed in a box nearby frequently became cloudy and unfit for use even though they were never exposed to light. In searching for a reason he soon discovered that this clouding occurred whenever a discharge took place in the tube. The correct conclusion was that some sort of extremely penetrating radiation emanated from the tube during its discharge. This radiation, being unknown at the time, he called X-Radiation or X-Rays.

Since that time science has discovered that when electrons are released from a hot metallic solid such as an incandescent filament, to streak through a vacuum at terrific speeds and strike the atoms of another metallic solid, the splash of energy released by the collision radiates away in electromagnetic waves. These waves may be as long as 6 or 8 hundred Angstroms so that they can be considered as either x-rays or ultra violet at such wavelength, or they may be as short as 1 or 2 hundredths of an Angstrom. They vibrate at frequencies ranging from 2 or 3 thousand trillion times a second to over a hundred thousand quadrillion times per second. In general, the higher the voltage or pressure forcing the electrons out of one solid (the cathode) and on their journey to strike the other solid (the anode), the faster they will travel, the faster will be the vibrations of released energy resulting from the collision, the shorter will be its wavelengths, and the deeper the radiation will penetrate a solid. Extremely long wavelength x-rays will not even pass through thin glass (as was pointed out in the discussion of short wave ultra violet), whereas the shortest ones which are produced by a pressure of well over a million volts will penetrate several inches of metal.

Since x-rays, like visible light, infra-red and ultra violet, are electromagnetic radiations but of much shorter wavelengths, it might be expected that they will have the reflection and refraction characteristics of those radiations in the longer wavelength regions. However, since their wavelengths are of the order of size of atoms, it is difficult to obtain anything other than a scattering and dispersion of rays, as well as absorption. Cer-

tain crystals having a precise spacing of atoms in their lattice structure will break x-rays into their component wavelengths similar to the way a prism breaks up light into colors. Only at extremely glancing angles, however, does regular reflection occur. One crystal which may be used in studying x-ray frequencies is ordinary rock salt (sodium chloride) since it has the necessary atom arrangement characteristics.

Because of the atomic dimensions of x-rays they are used commercially to explore crystal structures. Million volt x-rays are applied quite extensively in industry where metal hardening is accomplished with high heat and a consequent change in the crystalline structure of the metal. X-ray analyses of this sort are responsible for much more efficient production of much higher quality metals.

While the infra-red and ultra violet regions are split up into portions referred to as "near" and "far", depending upon their distance from the visible light band, x-rays are designated as "hard" and "soft". "Hard" x-rays are those resulting from voltages upwards of 100,000 volts whereas the "soft" ones originate with much lower voltages with, of course, much longer wavelengths and less penetrating power.

In ordinary medical work, x-rays are made to pass through the body and strike a photographic plate where the amount of radiation penetrating is recorded similar to the way a camera will record the visible light passing through a translucent solid. Bones or foreign objects which may have become lodged within the body do not permit as much transmission as skin or flesh so that they show up on the photographic plate as "shadows". Thus, broken bones, bullets, swallowed buttons, pins and similar objects can be readily located. Changes in tissue structure, such as might result from infection, malignant or tumorous growths, are also easily detectable on x-ray plates, so that the physician and surgeon find it possible to work much more accurately with an x-ray "blue print" of their tasks.

Such shadow pictures are also used extensively in many industries to locate defects in products made of wood, rubber, plastics, leather and even metal.

Gamma Rays

It will be noted that in the diagram of the range of electromagnetic radiation,* there is a wide overlap of x-rays with a region of radiations called

This giant million-volt X-Ray tube is used in industry to detect flaws in a metal casting.

Gamma Rays. This indicates that the radiations within this overlap can be called either X-Rays or Gamma Rays, and that they are identical in character regardless of their name or how they are produced.

Gamma rays are those which radiate from radio-active elements or substances such as radium or uranium. While the names of Pierre Curie and his wife, Marie Curie are associated with the discovery of radium, the radio-activity of uranium was noted shortly after Roentgen's discovery of x-rays by a French scientist named Antoine Henri Becquerel. Like Roentgen, Becquerel used photographic plates and found that uranium emitted radiations which fogged them. The Curies, in an effort to find more potent radiations than those resulting from uranium, experimented with the substance from which uranium is obtained—pitchblende, and did obtain radiations several times as strong. Further analytical work with pitchblende

resulted in the discovery of a new element which they called radium, in which the radio-activity was several million times stronger than uranium.

Radium is extremely rare, a great many tons of rich pitchblende ore being required to obtain one ounce of radium worth somewhere around 20 or 25 thousand dollars. Its radio-active property is the result of the instability of its atoms. All atoms, it will be recalled, are made up of a nucleus around which electrons swarm in definite established orbits, but in radium atoms, as in those of other radio active elements, there is a tendency for them to change their own structure with explosive force. There is a tremendous amount of energy (potential) within radium atoms so that when the explosion takes place with an atom, the energy is released as electromagnetic radiation of extremely short wavelengths and high frequencies. The amount of energy thus released in the complete change of one gram of radium is approximately equal to the energy supplied in the burning of a ton of coal.

This energy is not released, of course, by all the atoms at once. They explode at random but there are so many billions of them in a visible amount of radium that released energy is radiated at a rate which can be considered constant. Three types of rays are emitted when a radium atom explodes. One type is called Alpha rays which consist of positive particles released from the nucleus and which have comparatively little penetrating power. Beta rays, the second type, consist of negative electrons and are much more penetrating. The third type, Gamma rays, are not particles at all but electromagnetic waves. Radium atoms do not become inactive with one so-called explosion, but rather undergo a series of them over a period of many years. When completely deactivated, radium becomes lead and the period of time required for such a complete transition to a stable element is calculated at many millions of years. Thus, while the potency of radium diminishes gradually it remains practically a constant source of energy over the span of many lifetimes.

For medical purposes radium is usually used in the compound radium bromide of which about half is radium. Minute quantities of this compound are placed in tiny metal tubes no larger than a small sewing needle and inserted into tumor and cancer tissues where the radiations destroy the tissues. Other methods may be used but basically the treatment is to so apply the radiations that the diseased tissue will be killed without destroying too much of the surrounding healthy tissue. Obviously the problems are usually extremely difficult and the success of such treatments requires the skill and technique of a specialist. As has been explained, radium emanations are very penetrating and their precise control deep within the body is not always possible. When stored, the minute radium pellets are replaced in jackets of steel or lead, and kept in boxes of lead of considerable thickness so that no damage will be done to persons circulating in the vicinity of the storage vaults.

Equipment used in radium therapy. The tiny metal needles, held in the instrument and on the table in front, each contain 5 one-thousandths of a gram of radium bromide. These and others containing 10 one-thousandths of a gram are stored, when not in use, in the solid 4-inch thick block of lead.

Since x-rays of short wavelengths and gamma radiations from radium are one and the same, x-rays are replacing radium in certain types of medical treatment. Such x-rays, if they are to be of the same wavelength as gamma rays, must be produced by a million volts or more. Three, four or five million volts will produce even more penetrating and effective x-rays.

High voltage x-ray technique has developed rapidly during the past few years. Since the equipment required is less difficult to handle (though larger), and the treatments less delicate, the costs involved may be appreciably less than with radium. For that reason, x-ray equipment is found in many of the finest hospitals. The fact that such extremely high voltages are used does not indicate that there is danger of the patient being electrocuted. Where treatments of high voltage x-ray are given, the electrical apparatus and giant x-ray tube may be quite remote from the patient, such as in a room on the floor above with the radiations passing through special devices in the floor to the patient who reclines comfortably in pleasant surroundings in the room below.

As scientific research develops the means and methods of generating many millions of volts in

electron tubes, the shattering of atoms by streams of electrons traveling at inconceivable speeds will doubtless produce electromagnetic radiations much shorter in wavelength and much more penetrating than the ultra short x-rays of today. As a matter of fact, such radiations are detected in nature and are known as Cosmic Rays, but there is as yet a gap between man-made x-rays and the region of Cosmic Rays.

Cosmic Rays

Over 40 years ago, physicists concluded that some sort of radiation must exist in the atmosphere because under all circumstances air is found to be slightly ionized (a few of its atoms are found to be minus an electron and therefore positively charged). Furthermore, a comparatively simple device, called an electroscope, indicated the penetration of the unknown radiations at a depth of 30 or more feet in lake water as well as underground in mines and caves. The fact that these radiations were consistently much stronger at high altitudes than at the earth's surface led to the further conclusion that such radiations did not originate on this earth but rather somewhere out in the interstellar space.

In recent years investigations of the character of cosmic rays and their origin have been carried on extensively by a large number of scientists, both cooperatively and individually. Foremost among these men are R. A. Millikan, A. H. Compton and their co-workers, as well as a number of others. A few years ago the newspapers all over the world carried accounts of a Belgian scientist named Auguste Piccard who rose thousands of feet into the stratosphere in a specially designed balloon. At the time the novelty of the ascents appealed to the general public, but actually Piccard was accumulating valuable data on cosmic radiation strength at high altitudes.

From the information at hand, it appears that cosmic rays are quite complex, some being more penetrating than others. There is evidence that these rays may be of a particle nature such as a shower of electrons at terrific speeds. There is also other evidence which indicates that they are electromagnetic waves of much shorter wavelengths and higher frequencies than the shortest x-rays or gamma rays as shown at the extreme left end of the diagram of the range of electromagnetic waves*.

The origin of cosmic rays has not been definitely established. The fact that they do not reach the earth with greater strength during daylight hours eliminates the sun as a major source. Also, since their intensity does not diminish during the day or increase at night, they cannot be associated wholly with any particular group of stars such as the Milky Way.

Gamma Rays result when the atoms of a radioactive element disintegrate, or when electrons traveling at high speeds strike atoms and split them apart, thus releasing energy which radiates away in electromagnetic waves. Some theories suggest that cosmic rays are born when the reverse process takes place—that is, when atoms are put together. According to such theories, somewhere out in space matter is being created and some of the energy which results with mass, radiates away as cosmic rays—some of them reaching this earth.

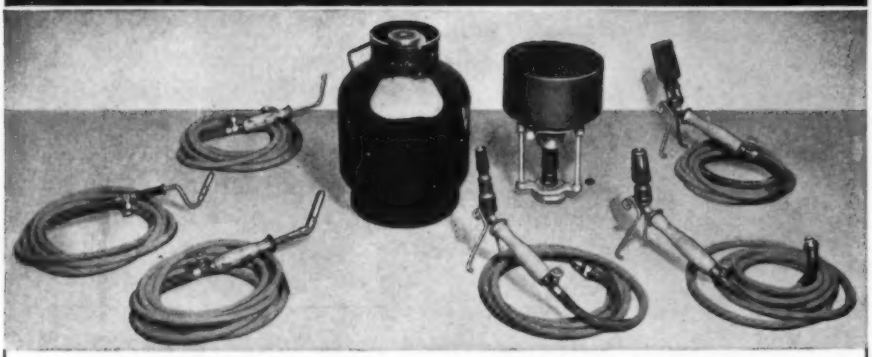
Any further consideration of cosmic radiation would not only be controversial but much too involved for discussion here. Part IV will cover more in detail the movement of electrons (cathode rays) and the movement of positrons (positive rays).

* The "diagram of the range of electromagnetic waves" referred to on pages 54, 58, 62, 63 and 65, will be published in the December issue of WHOLESALER'S SALESMAN along with the next installment of the "Primer of Electronics."

TO BE CONTINUED

For table of contents and chapter summaries see the July 1943 issue.

SELL INSTO-GAS TORCHES NOW FOR WAR PLANT MAINTENANCE AND REPAIR



There are six sizes of Insto-gas Torches. They produce flames ranging from a fine pencil size to a 24-inch blast. The metal melting furnace melts 40 pounds of solder in less than 6 minutes. Each torch, hose and furnace is packed in individual shipping carton.

KEEP WAR PRODUCTION ROLLING

Thousands of electricians have used these INSTANT LIGHTING, TIME SAVING Insto-gas Torches and furnaces for war plant construction.

NOW, all war production plants have urgent maintenance work requiring the use of Insto-gas equipment.

Insto-gas wholesalers also furnish gas refill service; a permanent repeat business from every set of equipment sold.

Our unique merchandising plan helps wholesalers sell Insto-gas to their industrial and contractor customers.

A letter or coupon request will bring complete information on — INSTO-GAS, THE MODERN PORTABLE HEAT.

Free Bulletin

MEMO TO INSTO-GAS

Please Mail Bulletin and details on Insto-gas merchandising plan.

Name_____

Firm_____

Address_____

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INSTO-GAS CORP.
DETROIT 7, MICH.

WPB Orders

(*Continued from page 27*)

Armored Cable Order L-165 Revoked by WPB

Limitation Order L-165 under which the production and sales of armored cable were controlled, was revoked on September 18, 1943 effective on that date.

Copper Orders New WPB Instructions

A letter from H. O. King, director, Copper Division, WPB, to all copper wire mills and copper wire mill warehouses on October 13th read:

"A copper Wire Mill Warehouse may not order nor may a Copper Wire Mill or Warehouse accept or deliver orders to a Copper Wire Mill Warehouse except as provided in:

"(1) WPB Instruction Letter WPBI-507 of July 26, 1943. (a) WPB Instruction Letter WPBI-507, provides for replacement of copper wire mill products delivered by warehouses in accordance with CMP Regulation No. 4. It provides for a Warehouse endorsement giving such replacement order the status of an Authorized Controlled Material Order.

"(2) Paragraph (f) (2) of CMP Regulation No. 4 as amended July 17, 1943. (a) Paragraph (f) (2) of CMP Regulation No. 4 authorizes a Warehouse to arrange for direct shipment of an Authorized Controlled Material Order from its supplier to a customer of the Warehouse. A shipment of this kind may be direct to a Warehouse customer provided that it is an individual order showing customers name, address, material and allotment number or symbol appearing on the customers order. (b) The practice of combining Authorized Controlled Material Orders received from customers of Warehouses for direct delivery to such customers, in care of the warehouse, into a single order on a Wire Mill or other Warehouse, is not an authorized Controlled Material Order and is not permitted by any Instruction or

Regulation of the War Production Board. All Wire Mills and all Warehouses must of necessity reject all such orders so received.

"Warehouses should order not less than minimum mill quantities (300 pounds copper content) as provided in paragraph (t) (2) (i) and Schedule IV of CMP Regulation No. 1. This applies to stock and direct shipment orders. Mills are permitted to and should reject orders for smaller quantities."

Flash and Flood Lamps Freed of Restrictions

A WPB release, number 4388, dated October 7, 1943, stated:

"Some Photoflash and photoflood incandescent lamps for civilians have been freed from restrictions requiring purchasers to submit preference ratings, the War Production Board announced today. General simplification of Order L-28, (Incandescent, Fluorescent and Other Electric Discharge Lamps) and removal of some restrictions on manufacturers were also effected by an amendment to the order.

"Previous restrictions which prohibited wholesalers or dealers from selling any photoflash or photoflood incandescent lamps except to fill purchase orders or contracts having preference ratings of AA-4 or higher, or to manufacturers, wholesalers or dealers were removed from the order. Control over production and distribution at the manufacturing level is maintained, however, and the War Production Board will authorize distribution of certain quantities of these lamps for rated orders for industrial or military purposes, and certain quantities for sale to persons or companies who are not in a position to extend a rating of AA-4.

"A contributing factor to the simplification of these restrictions was the decrease in demand for photoflood and photoflash lamps caused by existing restrictions on manufacture and sale of film and photographic equipment which have curtailed supplies to civilians.

"Delivery of lamp bases from lamp base manufacturers to lamp manufacturers is no longer subject to specific authorization of the War Production Board. Manufacturers of lamp bases are no longer required

AN UNBEATABLE COMBINATION

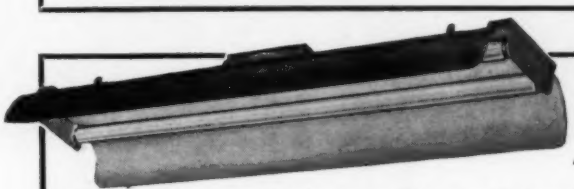
SILV-A-KING lighting equipment *plus* Silv-A-King lighting service makes an unbeatable combination! Nearly a quarter-century of specialized experience in the field of industrial lighting—both incandescent and fluorescent—is behind the Silv-A-King equipment you buy...and Silv-A-King lighting service includes expert guidance in planning the layout of your lighting installation to insure maximum efficiency. All Silv-A-King lighting units are made in conformity with RLM and other standards for the highest quality and efficiency. Silv-A-King lighting engineers are available to discuss your lighting problems.

SILV-A-KING RLM STANDARD DOME REFLECTORS

One-piece, drawn or spun, seamless steel reflector completely vitreous porcelain enameled, white inside, green outside. Highly efficient. Permissible spacing for these units, one-and-one-half times the mounting height. Made in sizes 12" to 20", 75 to 1,500 watts.

SILV-A-KING RLM DEEP BOWL REFLECTORS

Porcelain enameled finish on reflecting surface assures high-efficiency lighting and easy maintenance. Recommended for installation where spacing of units does not exceed mounting height. Made in sizes 8" to 16", 60 to 1,500 watts.



SILV-A-KING "VICTORY" UNITS

Efficient fluorescent lighting units with metal-saving reflectors of non-critical Silv-A-Tex. Units conform to all RLM Standards. High-gloss baked enamel reflecting surface comparable in efficiency to porcelain enamel. Silv-A-King "Victory" Units provide even, glare-free light for recommended "daylight" illumination or for supplementary lighting of individual machines or work areas.

SILV-A-KING RLM SYMMETRICAL ANGLE REFLECTORS

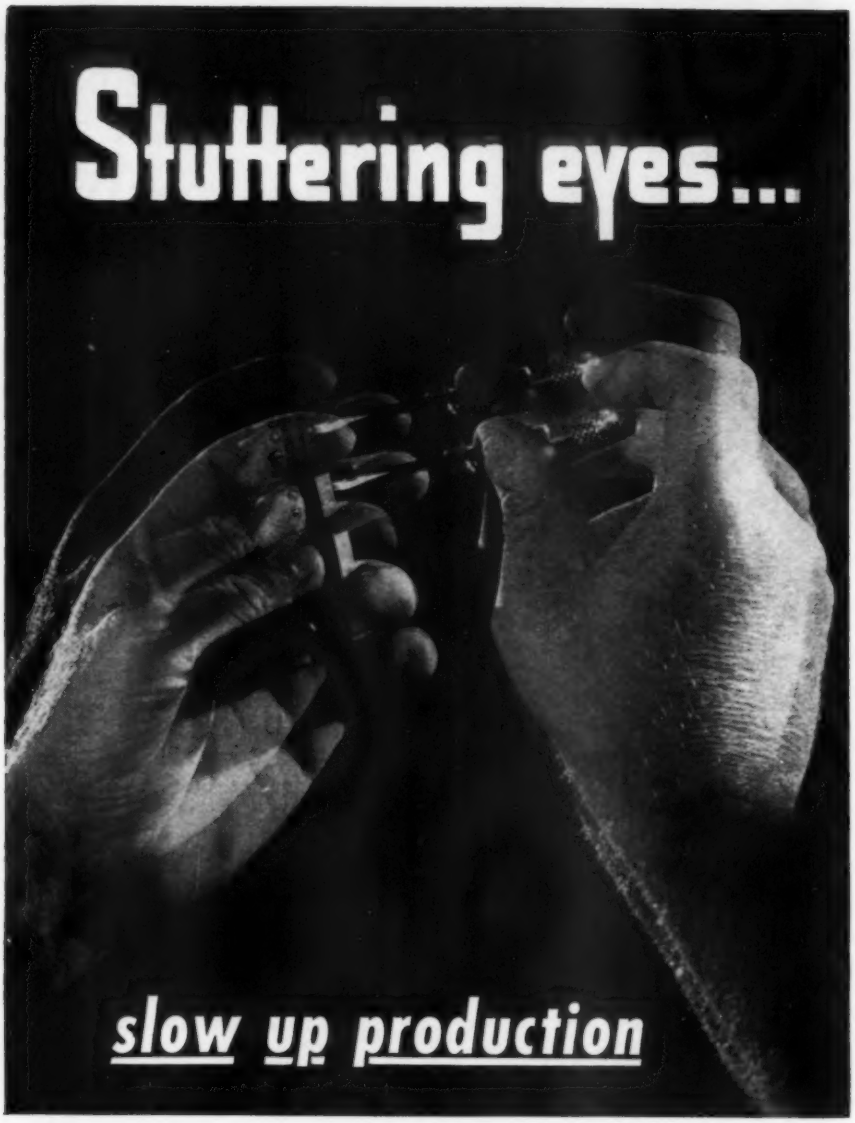
High efficiency, porcelain enameled reflecting surface. Units designed for angular distribution of light for illumination of vertical surfaces, such as walls, signs, etc. Made in sizes 8" to 16", 100 to 1,500 watts.

OTHER SILV-A-KING PRODUCTS

Dust-Tight Units
High Bay Mounting Units
"HIM" High Intensity Mercury Units
Island Lights
PAR-38 Projector Lamp Wiring Troughs
"RF" Rectified Fluorescent Luminaires
RLM Silvered Bowl Diffusers
Stock-Aisle Reflectors
Vapor-Proof Lighting Units

FLUORESCENT
SILV-A-KING
INCANDESCENT

BRIGHT LIGHT REFLECTOR CO., INC · *1031 Metropolitan Ave., Brooklyn 2, N.Y.*



Weary, "stuttering" eyes see things like this after hours of concentration. And it's a warning! It means that eye-fag is dulling the perception, wasting precious time when war production is crowding every hour.

Working speed increases noticeably as the illumination is improved. This simple fact, revealed wherever time studies are made, shows how light, when properly applied, becomes a *work stimulant,* providing the comfortable vision essential to most efficient production.

Goodrich illuminating engineers are devoting their entire efforts to assisting vital industries—making better illumination work for Victory. They will be glad to help you.

Sold Only Through Electrical Wholesalers

GOODRICH
ELECTRIC COMPANY
OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES AND FACTORY: 4610 BELLE PLAINE AVENUE, CHICAGO 41, ILL.

to file Form PD-532 with the War Production Board reporting the total metal weight of bases which he expects to be able to transfer or deliver.

"Other changes, which for the most part are in minor restrictions which have been outgrown, further simplify Order L-28."

Generator Order Amended

Purchasers of machinery into which has been incorporated a special electric motor or generator need no longer file a certification setting forth the use and purpose of the motor or generator.

Radio Tubes— Half-Million Released

During the first week in October, the War Production Board in its release Number 4395, announced that:

"More than a half million radio receiving tubes for home radio sets were made available for users . . by the Radio and Radar Division of the War Production Board. A total of 576,613 radio receiving tubes is in the possession of the Phillips Export Corporation, P. O. Box 69, Grand Central Annex, New York, N. Y. These tubes had originally been held for export, but after discussions between representatives of the Foreign and Domestic Branch of the Radio and Radar Division and officials of the Phillips Export Corporation, it was decided that the WPB should authorize sale of the tubes without restriction to the domestic market.

"Distributors or dealers purchasing these tubes will be governed by Limitation Order L-265 in their resale. The authorization allows any person to receive tubes from the Phillips Export Corporation without restriction as long as they are to be used domestically.

"These tubes are types that are generally used in home radio receiving sets. The number of tubes now available in the nation for maintenance and repair of household sets is now below actual needs, and the release of the half million tubes is a step towards making more tubes available for civilian uses."

News

(*Continued from page* 31)

of the Edwards employees "shows that they are keeping faith with our fighting forces whose success on the battle-front depends upon the ships (these employees) are helping to build."

Worner Products Corp. Renamed, Will Expand

The Worner Products Corporation of Chicago has announced reorganization of the company to meet demands for increased production. The new firm name is Worner Electronic Devices. Mr. Leon Worner continues as chief executive.

New and enlarged laboratory and production facilities were occupied by the company on November 1st at the company's new address: 848 North Nobel St., Chicago. Worner Electronic Devices is engaged in engineering, designing and manufacturing electronic equipment.

TIME KILLER for customers who no longer have displays to look over while awaiting their turn at the city counter of GE Supply, Portland, Ore., is this panel of photographs of announcers on the GE "World Today" radio program. The success of this display has encouraged the management to consider other types of human interest displays.

Latrobe PRODUCTS

★ FLOOR BOXES ★ WIRING SPECIALTIES ★

HIGH QUALITY

EASILY INSTALLED

Latrobe Products Sell Best Because They Serve Best

Latrobe Floor Boxes and wiring specialties are designed for quick installation. They will meet every requirement of the unusual emergency. But, best of all, they are also designed for long trouble-free service.

NO. 284 NOZZLE

This "Latrobe" Duplex Receptacle Nozzle is very neat and compact. Furnished with ½" or ¾" brass pipe extension.

NO. 150 FLOOR BOX

Latrobe Watertight Floor Boxes for quick installation in concrete and wood finished floors. Neat design. Few parts.

NO. 330 UTILITY OUTLET

Right for use in wood floors, baseboards, show windows and other installations free from moisture or mechanical injury. No superfluous parts to work loose.

NO. 403 INSULATOR SUPPORT

Insulator shown attached to 2½ inch conduit. With No. 466 Pipe Hanger. Supports available in four sizes from 1 inch to 2½ in.

Stock Latrobe Products

Sell Latrobe Products

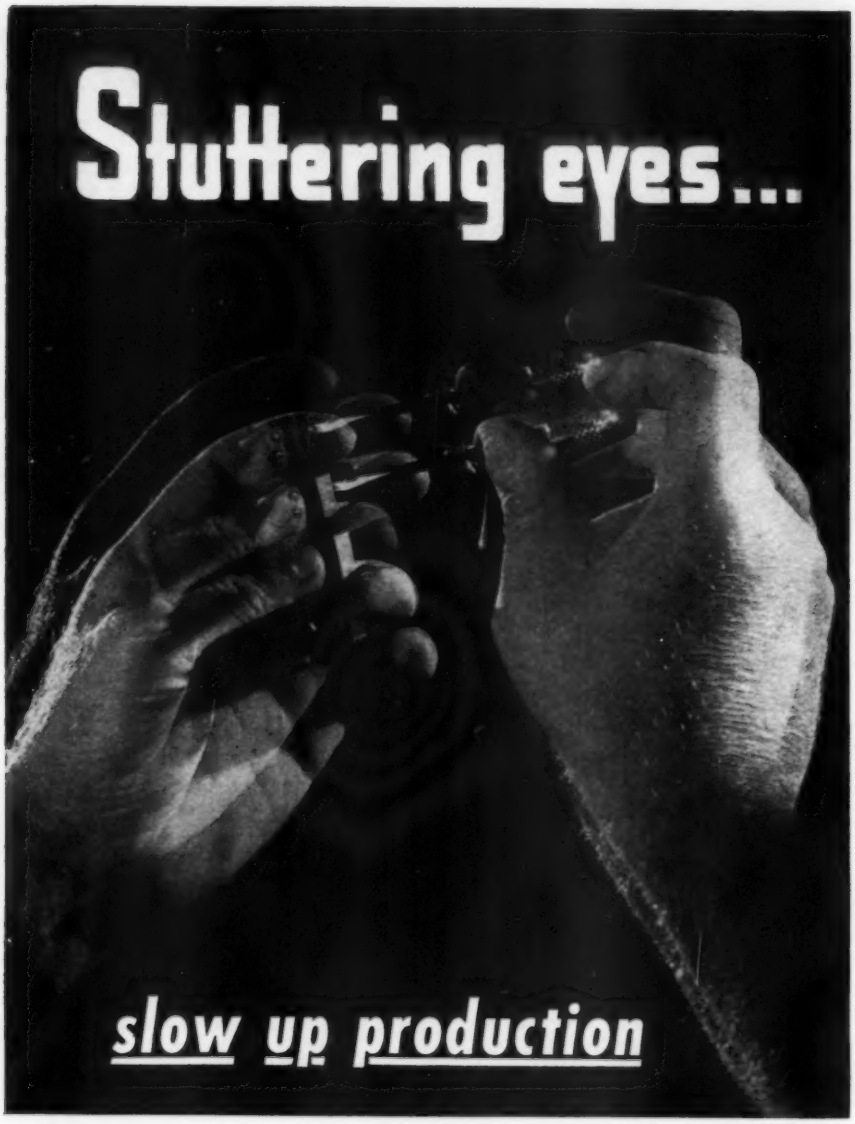
"LATROBE" CONDUIT BENDER

Combination ½ in. and ¾ in. Bender with reversible jaw to fit either side. Made of Tuf-A-Loy steel.

DURABLE

ECONOMICAL

FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA



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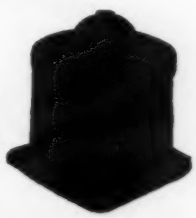

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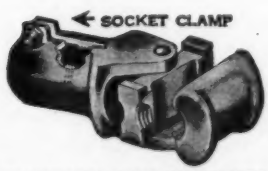

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FULLMAN MANUFACTURING CO. QUALITY AT LATROBE OBSUPREMACY LATROBE, PA.

FULLMAN MANUFACTURING CO.

LATROBE . . . PENNSYLVANIA

VETERANS OF SERVICE

WARS are no new experience for Mathias Klein & Sons. Years before the first gun was fired on Ft. Sumter, the little forge shop of Mathias Klein was laying the foundation for the manufacture of quality tools that is so much a tradition at Klein's.

When the Victory of Dewey at Manila thrilled the nation, the newly born electrical industry already knew that it could place reliance on tools carrying the name Klein.

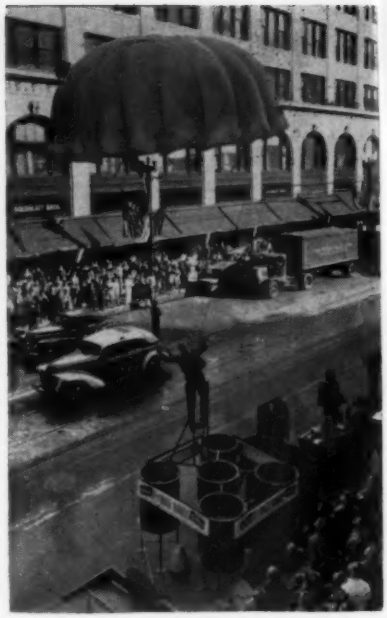
Today thousands of electricians and mechanics in the Army, Navy and essential industries are learning that Klein tools give plus service under the tough conditions that war imposes. When the war is won, Klein tools will continue to represent the maximum in service because of the hand-crafted conception of quality that has characterized Klein equipment "since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

This Booklet on the care of Tools will be sent to anyone interested.

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS



PROMOTING WAR BOND sales with a parachute demonstration in Chicago, this "jumper's" 'chute is opened and billowed aloft by air from the five 11g Electric 30-inch fans operating vertically below him.

Westinghouse Output At New High

Backlogs of unfinished orders held by the Westinghouse Electric and Manufacturing Company totalled $900,000,000, according to a statement by A. W. Robertson, chairman, to the board of directors recently.

This total did not include the $141,000,000 in orders cancelled by the government during the first eight months of the year, Mr. Robertson stated. In August alone, he said, the company received orders amounting to $89,000,000, and shipments in that month totalled more than $67,000,000.

Union Metal Co. Buys Superior Switchboard Co.

Union Metal Manufacturing Company, Canton, Ohio, has purchased the controlling stock of the Superior Switchboard and Devices Company, also in Canton.

Officers of the newly purchased company are: C. A. Orr, president; who is also president of the Union Metal Manufacturing Co.; C. A. Streb, secretary, also secretary of Union Metal; V. J. Lajeunesse, treasurer and general manager.

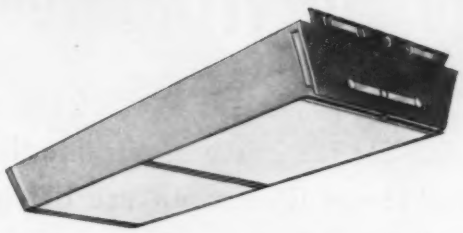
Lamperti Promoted At Graybar

A. C. Lamperti has been appointed secretary and comptroller of Graybar Electric Company. He succeeds M. E. Wagner who has retired after 45 years of service.

Mr. Lamperti has been connected with the accounting end of the wholesaling business throughout the 23 years he has been with Graybar. In 1933 he was made assistant secretary and in 1940 he was appointed general auditor.

NEW WESCO MANAGERS in California offices have been named by E. J. Duggan, district manager of the company. J. Clyde Williams, top, formerly apparatus and supply manager at the San Francisco branch, has been made manager of the branch at Tenth and Alice Streets, Oakland. Howard G. Brown, lower photo, formerly assistant to Mr. Williams, has been appointed to succeed him as apparatus and supply manager at the San Francisco headquarters.

KEEP AHEAD WITH LEADER!



URC Research Luminaires are finished in rich silver-gray enamel with high reflecting chip proof white enamel throughout. Knockouts are on top for stem mounting. Provisions are made for continuous mounting in the end plates which lock raceway sections together with nipples and locknuts. Single and double type track units furnished of No. 18 USSG steel. Bottom panels of double prismatic ribbed glass—side panels double strength ribbed glass. Takes four 40-watt 48-inch tubes, latest type approved Tulamp ballasts and easy replaceable starter switches. Operates on 110-125 volt, 60 cycle, A.C.

U R C Research LUMINAIRES

ZEPHYRLITE INDUSTRIAL UNITS

ZEPHYRLITE Industrial Unit 340 is engineered to meet the requirements for high level illumination where greater foot candle intensity is required. Channel finished in gray backed enamel as is top surface. Reflector double coated baked enamel, reflecting surface white. Reflecting factor app. 89%—60 cycle, 120 volt, A.C. All units equipped with two side hangers for chain or rod suspension. Knockouts for conduit or pipe suspension. Knockout in channel on 24" and 36" centers. Side top knockouts for switch installation. Takes three 40-watt T-12 fluorescent lamps. Shipping weight 29 lbs.

• Today's particular and intensive manufacturing requires specialized lighting — engineered to the present swift tempo. LEADER offers fluorescent lighting units to meet these needs . . . units that help Jobbers keep ahead of the times — they open up untold and unlimited opportunities for good lighting business. Fluorescent lighting is the illumination of the future and this complete line by LEADER presents a revenue source that is barely tapped.

Our modernly-equipped factory and competent staff of illuminating engineers assure excellence of product and strict conformity to specifications. Let us send descriptive bulletins which give specifications, details of manufacture, and illustrations.

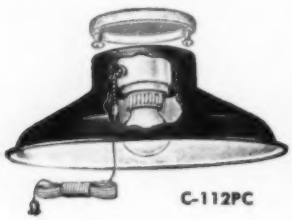
Engineering Facilities in all principal cities

LEADER ELECTRIC MFG. CORP.

6128 BROADWAY **CHICAGO 40, ILLINOIS**

NEW Lighting Equipment to Fill VITAL Needs

You still have *Vital* needs to fill—essential lighting requirements, for which Steber items are immediately available. The few new items illustrated are designed especially for *NOW*.



C-112PC

NEW STEBER ITEMS

COVERLITES (reflector and socket assemblies), for outlet box mounting, are now available in *Porcelain Enamel* as well as in standard *Ultranamel Finish*. Standard and Shallow Domes, furnished with keyless or pull chain sockets, for lamps of 60 to 300 watts capacity.

●

RWP-112

REFLECTORS, with new patented one-piece shade holder welded to the reflector neck. To install, tighten only one screw. Low initial cost. Saving in labor. In either Porcelain Enamel or Ultranamel — for weather-proof or porcelain sockets. Standard or Shallow Dome types. 60W to 200W.

●

NO. 2157

DEEP BOWL REFLECTORS, suitable for high bay use. Also particularly adapted to applications in *dim-out areas* where shielded light with pre-determined cut-off is required. Shade holder and easy-detachable socket types in Porcelain Enamel and Ultranamel. 15W to 1500W. For complete data, request Bulletin 105A with chart and cut-off table for dim-out applications.

YARDLIGHTS—brand new streamlined economy *Yardlights* for locations where vibration results from high winds or other causes. Spring-suspended sockets reduce vibration and prolong lamp life. 1½"x18" rigid bent pipe with either Porcelain Enamel or Ultranamel reflector. Cast iron socket head with eyelet for attachment of guy wires. Wired complete, with mounting screws included in individual packages. Conform to REA specifications.

VIP-12

Uti-Lite No. 2 flood and spotlight, widely used for outdoor lighting of playgrounds, community projects, parking lots. Used with Par-38 Mazda lamp.

Steber is constantly adding new items and introducing refinements and improvements, to meet changing requirements and help you maintain your volume of sales. Check these over, and write or wire for rush stock shipment.

STEBER MANUFACTURING CO.
2451 No. Sacramento Ave., Chicago 47, Illinois

STEBER
LIGHTING EQUIPMENT

ALFRED M. STREET has been named publicity manager for Jenkins Bros., Bridgeport, Conn., manufacturers of tape and valves. He will have charge of the company's advertising programs, succeeding Charles C. Chamberlain who has been made general sales manager.

"E" Renewed at Hazard Wire Works

A second six-month renewal of its Army-Navy "E" has been received by the Hazard Insulated Wire Works Division of the Okonite Company, Wilkes Barre, Pa., for continued excellence in manufacturing electrical wires and cables for the armed forces.

W. E. ADDICKS has been appointed manager of the New York district office for Cutler-Hammer, Inc., Milwaukee. He has been with C-H since 1914 and holds a number of patents on motor control and other electrical devices.

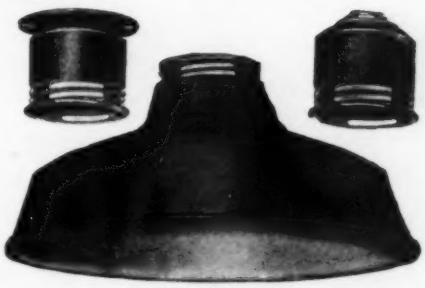
BERNARD H. SULLIVAN, whose appointment to the sales administration staff of the General Electric Lamp Department at Nela Park was announced recently, was formerly general sales manager of the Westinghouse Lamp Division. He had been associated with lamp sales at Westinghouse since 1922, and before that was connected with the Commercial Electric Supply Co., St. Louis.

WILLIAM J. CASHMAN, newly appointed director of publicity and promotion for Landers, Frary and Clark, New Britain, Conn., manufacturers of electric appliances, has been specializing in the merchandizing of appliances since he joined the appliance department of a utility in 1924. He has been with L. F. & C. since 1934.

QUAD

ADJUSTABLE PORCELAIN ENAMELED FLOODLIGHT

RLM



No. 1184-M
RLM THREADED
DOME REFLECTOR

LIGHTING • UNITS

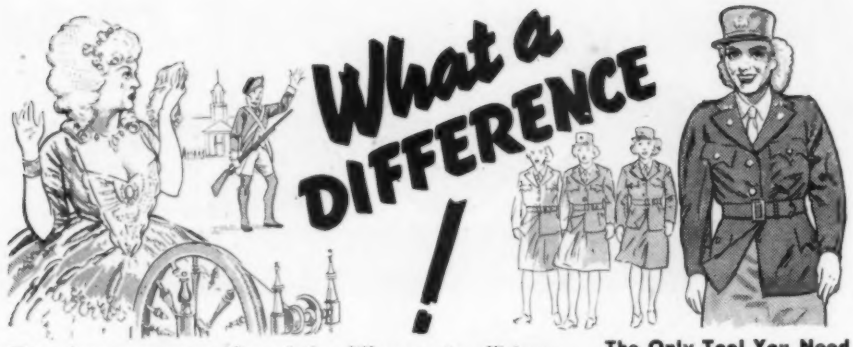
Satisfied customers are really what count for any contractor — QUAD units satisfy the customer and build good business. QUAD Units are in constant demand, year after year, and some typical comments are: "a great line" — "more profit" — "you can depend on QUAD" — The QUAD line helps you to meet all requests — indoor and outdoor — commercial or industrial — new or replacement.

QUAD—for today and for tomorrow—

QUADRANGLE MFG. COMPANY

Mfgrs. of Incandescent and Fluorescent Lighting Equipment

32 SO. PEORIA ST. CHICAGO, ILL.



This gives you some idea of the difference in efficiency and RESULTS—when you use the ultra-modern BRIEGEL METHOD of making thin wall conduit connections instead of many old-fashioned methods still on the market.

***You conserve critical steel*—Briegel fittings are made with 25% less steel than any other fittings on the market.**

***You save time*—just two squeezes with the patented B-M "indenter" (illustrated at right) and a smooth, clean connection is made. No extra turns or twists—no nuts to tighten. Up to 50% saving on precious time!**

The Only Tool You Need
(Costs just $1.25)

Prompt Deliveries on All Properly Rated Orders!

***You save materials*—fewer items to buy and handle. MORE PROFIT ON EVERY JOB!**

Approved by Underwriters' Laboratories

Distributed by

The M. B. Austin Co.	Chicago, Ill.
Clayton Mark & Co.	Evanston, Ill.
Clifton Conduit Co.	Jersey City, N. J.
General Electric Co.	Bridgeport, Conn.
The Steelduct Co.	Youngstown, Ohio
Enameled Metals	Pittsburgh, Pa.
National Enameling Mfg. Co.	Pittsburgh, Pa.
Triangle Conduit & Cable Co.	New Brunswick, N. J.

BRIEGEL METHOD TOOL CO., Galva, Ill.

Big Beam
PORTABLE ELECTRIC
Rechargeable
HAND LAMP

SETS A NEW HIGH STANDARD IN PORTABLE ILLUMINATION

IMPORTANT FEATURES

- **Patented Reservoir** seals in vent caps and collects fumes caused by charging or discharging of battery, thereby preventing corrosion of battery terminals and all other parts.
- **Battery Container** made of No. 18 gauge steel, gas welded seams. Special baked enamel finish that is impervious to acid, weather conditions, and rust.
- **Lamp Head** black japanned — high quality steel, mounted on carrying handle with a swivel that allows head to be directed in any vertical arc of 170 degrees.
- **Two Bulbs** are installed in a Silver Plated Reflector. Main bulb is a pre-focused type designed to give maximum in beam candlepower. **A small auxiliary bulb** is provided for times when a great amount of light is not needed. Will burn 70 continuous hours.
- **Switches** can be operated by thumb or finger while carrying lamp. The main bulb and auxiliary bulb are each controlled by a separate switch, heavy duty, single pole, toggle type.
- **Lens ½"** convex heavy duty crystal glass practically unbreakable. We can furnish a lens for powerful flood-lighting which is interchangeable with the regular lens.

BIG BEAM throws a brilliant beam over 2500 feet . . . burns 10 hours on one charge . . . has finger-tip control. Applications are unlimited for industrial and commercial uses . . . always ready for instant service because of many new features incorporated. Battery can be re-charged without removing from container. Send for descriptive literature for more complete information.

U-C LITE MFG. CO.
11 East Hubbard St., Chicago 11, Illinois

TEAMED UP to handle contractor accounts are these two salesmen of Graybar in Salt Lake City—J. J. Martineau, left, and D. H. Hutchinson.

NEW ASSISTANTS to the Lamp Manager of the Westinghouse Lamp Division, Bloomfield, N. J., have been appointed. They are: R. F. Tucker, who has been assistant division auditor since 1939 and Adolph Frankel (lower photo), formerly assistant manager of the Special Products Commercial Department.

Association News

KANSAS CITY—The Electrical Association of this city at a recent meeting heard an interesting and timely talk on (1) "How the Electrical Industry Has Helped the Army Signal Corps," and (2) "The Development of Signal Corps Personnel," given by Lt. Col. George L. Martin of the Central Signal Corps School, Camp Crowden, Missouri.

An interesting talkie film, "The Nazi Strike," edited by the U. S. War Department and made up largely of captured enemy film, was shown at a luncheon meeting at the Hotel President. The film revealed the present political development in Germany and Hitler's progress in subjugating various European countries. The film was made possible through the courtesy of Captain E. E. Grossman, of the U. S. Marine Officer Procurement Office.

Joe Porter, Jr., Chairman of the Greater Kansas City Committee for Economic Development and Post-War Planning, addressed the National Association of Cost Accountants at a dinner meeting presenting many ideas for handling post-war competitive problems.

The Electrical Maintenance Engineers group of Greater Kansas City, sponsored by the Electric Association, had a short discussion on carbon brush characteristics. Mr. A. W. Wolff, Technical Representative, National Carbon Company, was the guest speaker. The discussion was followed by a film, "Modern Pyramids."

MILWAUKEE—At a recent meeting of the Electrical League of Milwaukee, an interesting program on electronics was presented through the courtesy of Westinghouse Electric Mfg. Co., East Pittsburgh, Pa. Mr. Carl J. Madson, consultant on electronics for Westinghouse, spoke on the operation of electronic devices and how electronic tubes

ACF *"A Quality Line at Competitive Prices"*

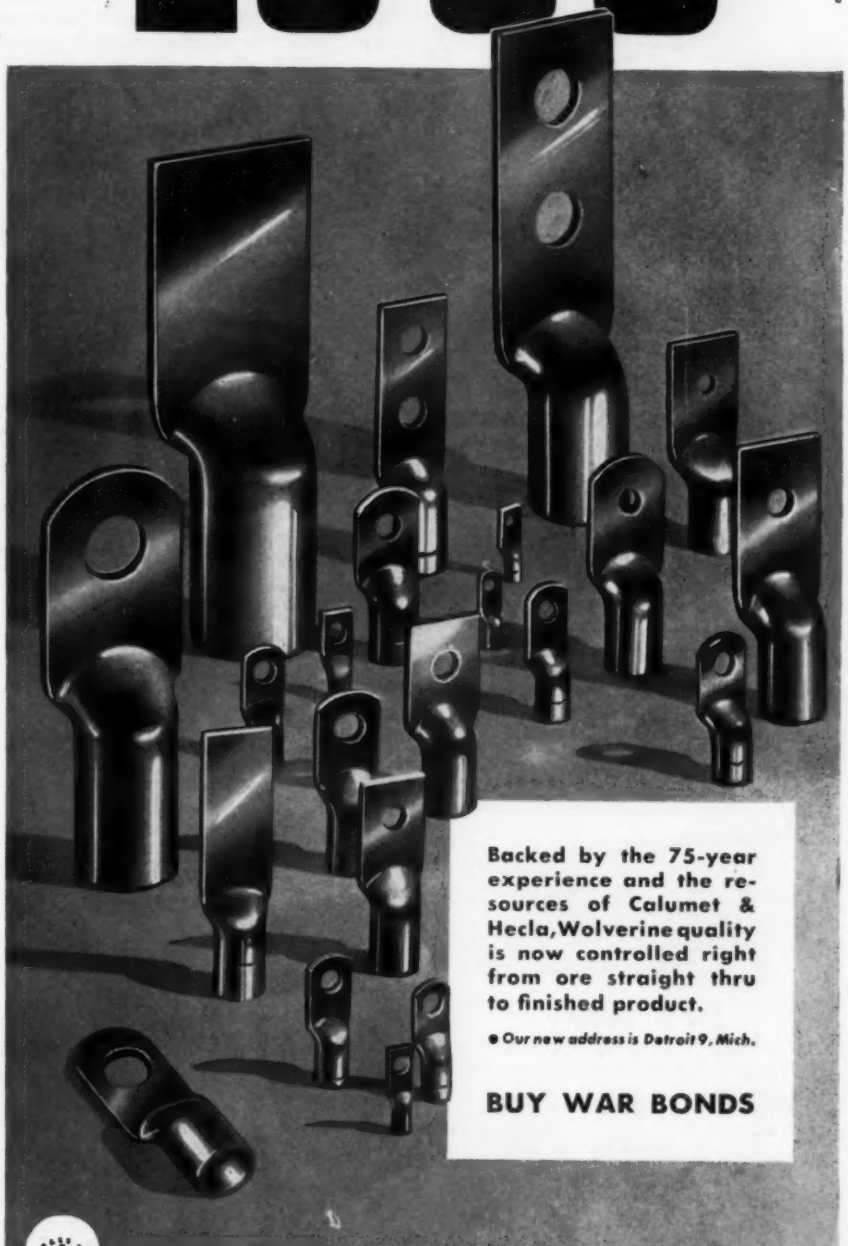
A full line of quality conduit fittings and connectors. To assure your contractor and industrial customers of full satisfaction, sell them the A.C.F. line.

Illustrated is a ⅜" Non-Metallic Sheathed Cable Connector.

Write for descriptive bulletins and prices.

ATLANTIC CONDUIT FITTINGS CO.
589 Atlantic Avenue • Boston, Mass.

SOLDERING LUGS



Backed by the 75-year experience and the resources of Calumet & Hecla, Wolverine quality is now controlled right from ore straight thru to finished product.

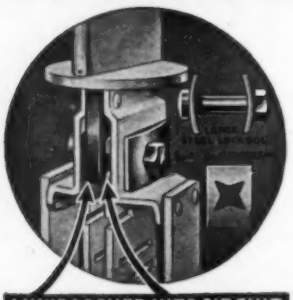
• Our new address is Detroit 9, Mich.

BUY WAR BONDS

CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
WOLVERINE TUBE DIVISION
Seamless Copper — Brass
1425 CENTRAL AVENUE DETROIT, MICHIGAN

Protection Safety with COOL FUSES

WARE HI-LAG



LINKS LOCKED IN TO CIRCUIT

NON-HEATING CONTACTS

Keep Motors Humming

ARMY E NAVY

100% Quality

APPROVED BY UNDERWRITERS

Mfgr's. Agents Territory Open

WARE BROTHERS

4420 W. Lake St. Chicago, Ill.

WARE

Renewable

HI-LAG FUSES

are applied to the service of man. In addition to his talk, Mr. Madson showed a new sound film, "Electronics at Work," which illustrates and explains briefly and clearly six basic ways in which electronic tubes function.

NEW ORLEANS — The executive committee of the Electrical Association of New Orleans held a luncheon meeting at the St. Charles Hotel, with President Otto Kaelin wielding the gavel and the following members in attendance: Messrs. Meek, Lindauer, Green, Roos, Brown, Wands, McCall, Avegno, Salvant, Tufts, and Guidroz. Plans for future meetings were brought up for discussion, and these include the showing of a film which dramatizes the rapidly developing field of electronics.

Members of the New Orleans association also voiced their particular pleasure over the news that J. E. North, under whose guidance the Electrical League of Cleveland has become outstanding among similar associations in the country, has been appointed sales manager of the Cleveland Electric Illuminating Company. What pleases them more is, that Mr. North will continue in the presidency of the Electrical League.

RICHMOND—The Electrical League of Richmond has as its guest speaker, J. G. Holtzclaw, president of the Virginia Electric & Power Company, who addressed the Association, October 11, on the subject, "Post-War Prospects for the Electrical Industry." Boyd A. Propert, chairman of the program committee, announced speakers for future meetings—C. B. Peck, Jr. of the Anaconda Wire & Cable Company, Washington, and Davis M. DeBard, vice president of Stone & Webster Service Corporation, New York.

OBITUARIES

Robert H. Gill

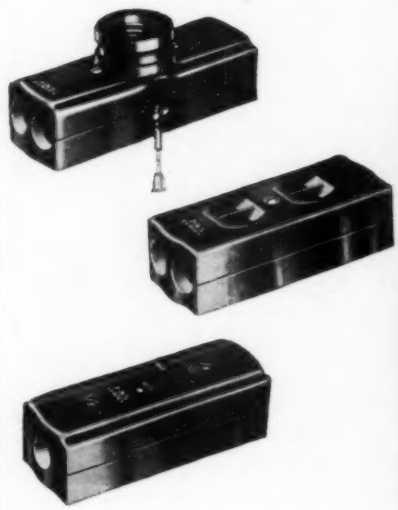
Robert H. Gill, purchasing agent of the Wolverine Tube Division of Calumet and Hecla Consolidated Copper Company, Detroit, passed away at his home on October 10th.

Mr. Gill had been an employee of Wolverine Tube for the past 14 years, but illness had kept him away from his desk

Conserve CRITICAL MATERIALS

★

USE P&S PORCELAIN WIRING DEVICES



There is still a definite need to conserve every ounce of critical material — and there is electrical wiring that must be done.

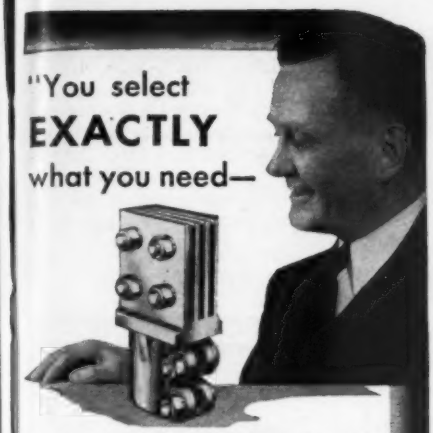
P&S Porcelain Wiring Devices —backed by over fifty years manufacturing experience — will do the job and do it well. Use Porcelain Sockets and Receptacles. Use P&S Surfex, the surface wiring device line made of porcelain.

P&S

PASS & SEYMOUR, INC.

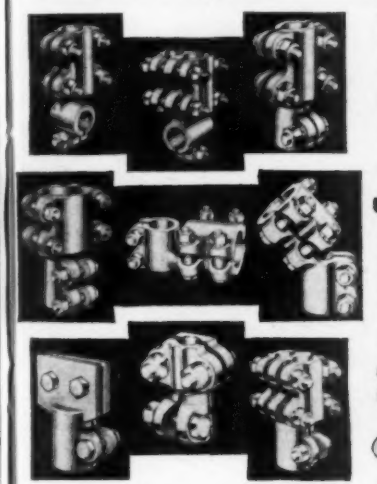
SYRACUSE 9, N. Y.

"You select
EXACTLY
what you need—



— from the COMPLETE line"

Stud Connectors and Solderless Terminal Adapters for distribution and power transformers . . . for connecting to cable, pipe or bus bar . . . in line or at any angle. Connectors with reversible clamping caps take two different ranges of cable sizes. Furnished for any number of conductors. A few of Penn-Union's many types:



Also . . . the most complete line of Service Connectors, Cable Taps, Tees . . . Straight and Parallel Connectors . . . Bus Supports, Spacers . . . Grounding Clamps, Terminal Lugs, etc. etc.

Penn-Union conductor fittings are the first choice of leading utilities, industrials, electrical manufacturers and contractors—because they have found that *"Penn-Union" on a fitting is their best guarantee of Dependability*. Write for Catalog.

PENN-UNION ELECTRIC CORPORATION
ERIE, PA. *Sold by Leading Jobbers*

PENN-UNION
Conductor Fittings

off and on during the last two years. He was 53 years old.

Mr. A. L. Woods, who has been assistant purchasing agent, will take over Mr. Gill's duties as purchasing agent for the division.

Sayre M. Ramsdell

Sayre M. Ramsdell, president of the Sayre M. Ransdell Associates advertising agency, died at his home in Churchville, Pa., early in October. He was well known in the electrical field for his long career as an advertising executive with the Philco Radio and Television Corp., and as advertising agent for that concern.

Mr. Ramsdell became connected with Philco in 1919, when the company was known as the Philadelphia Storage Battery Company. He worked in the advertising department, and was active in the expansion of that company into the radio and allied electronic fields. In 1934 he was named a vice-president of the corporation to head its advertising and sales promotion activities, and in 1940 was chosen a director of the company.

In 1940, Mr. Ramsdell resigned from Philco to establish his own advertising agency. His principal accounts were the Philco Radio and Television Corporation and the National Union Radio Corporation.

MORE FACTS ON PRODUCTS

Air Conditioning and Industrial Refrigeration — Twenty-page booklet, 3AC-0201, published by the Westinghouse Electric & Mfg. Co., East Springfield, Mass., illustrates and describes the company's hermetically-sealed compressor, and traces its development from the 1932 models up to the present design. It also includes explanations and diagrams concerning the principles of air conditioning and refrigeration.

When writing mention WHOLESALER'S SALESMAN

Electrical Equipment—Maintenance handbook, No. 143, issued by the Ideal Commutator Dresser Co., Sycamore, Ill., includes illustrations and descriptions of the company's line of industrial electrical equipment, variable speed transmissions, machine tool accessories, wiring devices and tools.

When writing mention WHOLESALER'S SALESMAN

An Open Letter to

INDUSTRY

Should you require APPROVAL or ENDORSEMENT before you stock and use

VERD-A-RAY

read September issue of OHIO STATE MEDICAL JOURNAL ---in an article it says that eyestrain is relieved through use of this lamp.

Also read SAFETY ENGINEERING MAGAZINE for March 1943 and learn how one war plant in one month in one department reduced hospital treated headaches by 69.13%, hospital dressed minor injuries by 54%, and saved 367 productive man hours, by proper installation of this new lamp.

Ask the sales clerk in any chain variety store what customers say about this new lamp when THEY COME BACK TO BUY MORE.

SAVE ELECTRIC CORP.
TOLEDO 5, OHIO

REFUSE OTHERS . . . .
RE-FUSE WITH ROYAL!

Originators of:
- "Crystal" Glass-Top
- Tell-Tale Disc
- Hexagon Head (up to 15 amps)
- Packaging that Sells

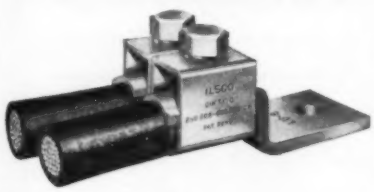
For all FUSE and WIRE needs, remember ROYAL — a good name to "go buy"

ROYAL
ELECTRIC COMPANY, INC.
95 GRAND AVENUE • PAWTUCKET, R. I.
Wire • Plug Fuses • Cartridge Fuses • Cord Assemblies • Christmas Outfits

ILSCO
Electrical Connectors

REMEMBER: ILSCO PRODUCTS are made from pure copper drawn to size in our modern Ilsco plant to insure precision and satisfaction.

MULTIPLE CONNECTORS



Big fellows for big jobs:
LU4 for wires from 0 to 350,000 c.m.
LU6 for wires from 250,000 to 500,000 c.m.

Designed for most efficient performance. Simple, accurate, dependable . . . ample contact area for sustained overloads. No special tools required. Quickly installed.

MAIL THIS COUPON TODAY

Please send details and 32-page illustrated catalog.

Name.....

Firm Name.....

Address.....

ILSCO COPPER TUBE & PRODUCTS, Inc.
CINCINNATI, OHIO

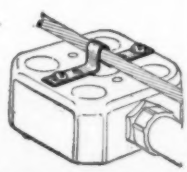
MINERALLAC

New Practical Unit to Cut Installation Time

● The "Messenger Hanger" and the "Messenger Strap" fill the need for an economical, practical, time-saving unit for use with the new messenger cable type of installation. Mechanically strong, durable, lightweight. They save considerable material and are easily and quickly installed. Our bulletin gives full and complete details—send for it.

See your Jobber.

"Messenger Hanger" for Conduit and Cable Strong, made of Cadmium Plated Steel or Everdur. Top loop of hanger grips messenger cable to permit conduit to be put in place without falling off.



"Messenger Strap" for Outlet Boxes Of Cadmium Plated Steel or Everdur. For messenger cable installaton to be used with Mineralac "Messenger Hanger." Fits all standard outlet boxes and ⅜" messenger cable.

MINERALLAC
ELECTRIC COMPANY
New York City Office 50 CHURCH ST.
THEODORE B. DALLY
25 N. Peoria St. Chicago

Control System — Twenty-four page illustrated bulletin, GEA-3856, issued by the General Electric Company, describes how most control systems can be built up by combining standard control units and accessories into the required number of sections. The publication also lists many uses and explains in detail how the equipment is manufactured.

When writing mention WHOLESALER'S SALESMAN

Terminal Tubes—Eight-page booklet issued by the Mid-Continent Metal Products Company of Chicago, Illinois, contains illustrations and diagrams, including dimensional data in inches, of the company's various types of drawn steel terminal tubes used to provide an entry for electrical cables into water-tight, sheet steel enclosures.

When writing mention WHOLESALER'S SALESMAN

Electronic Heaters — Bulletin GEA-4076, recently issued by the General Electric Company, describes the electronic method of heating metals, emphasizes its simplicity, and gives in detail the specifications of both the 5-kw and the 15-kw, 550-kilocycle electronic heaters. Also included in the bulletin are illustrations of many important small parts which may be brazed, soldered, or surface hardened by electronic heating.

When writing mention WHOLESALER'S SALESMAN

Wrenches—Twenty-four page catalog, No. 243, contains illustrations and descriptions of the various socket, open-end and box type wrenches, torque indicators and wrench assortments as manufactured by the Blackhawk Mfg. Co., Milwaukee, Wis. The bulletin includes also a "dictionary of popular wrench terms" and a guide to wrench and socket sizes for bolts and nuts.

When writing mention WHOLESALER'S SALESMAN

Expansion Anchoring Devices—New 20-page catalog presents helpful data for users of all types of expansion anchoring devices such as expansion bolts, expansion nuts, anchoring units, toggle bolts, lead wood-screw shields, hook bolts and drilling devices, manufactured by the Chicago Expansion Bolt Company, Chicago, Ill.

When writing mention WHOLESALER'S SALESMAN

TID-BITS

"From where I sit in Washington, it grows clearer every day that the nation is growing constantly stronger, more determined and more unified to achieve its purpose and to smother the Axis with war production."—Donald M. Nelson, chairman of the War Production Board.

Bomb shelters are being designed to withstand the terrific force generated by bombs 2000 pounds and heavier, on anything but a direct hit.

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of Wholesaler's Salesman, published monthly at Albany, N. Y., for October 1, 1943.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Wholesaler's Salesman, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Publishing Company, Inc., 330 West 42nd St., N. Y. C. 18. Editor, O. Fred. Rost, 330 West 42nd St., N. Y. C. 18. Managing Editor, Howard J. Emerson, 330 West 42nd St., N. Y. C. 18. Business Manager, O. Fred. Rost, 330 West 42nd St., N. Y. C. 18.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder, the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) McGraw-Hill Publishing Company, Inc., 330 West 42nd St., N. Y. C. Stockholders holding 1% or more of stock: James H. McGraw, 330 West 42nd St., N. Y. C. James H. McGraw Jr., 330 West 42nd St., N. Y. C. James H. McGraw, James H. McGraw, Jr., and Curtis W. McGraw, Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw, 330 West 42nd St., N. Y. C. Edwin S. Wilsey and Curtis W. McGraw, Madison, New Jersey, Trustees for James H. McGraw, 3rd., Curtis W. McGraw, 330 West 42nd St., N. Y. C. Donald C. McGraw 330 West 42nd St., N. Y. C. Anne Hugus Britton, 330 West 42nd St., N. Y. C. Mildred W. McGraw, Madison, New Jersey. Grace W. Mehren, 73 No. Country Club Drive, Phoenix, Arizona. Wilson C. Laucks, 1501 Cleveland Avenue, Wyomissing, Pennsylvania.

3. That the known bondholders, mortgagees, and other security holders, owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner: and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is. (This information is required from daily publications only.)

J. A. GERARDI, Secretary.

McGRAW-HILL PUBLISHING COMPANY, INC.

Sworn to and subscribed before me this 29th day of September, 1943.

[SEAL] EMILY Z. SHEPARD.

Notary Public, New York County, New York Clerk's No. 768, N. Y. Co. Reg. No. 4S1275.

(My commission expires March 30, 1944)

Essential in War
Essential in Peace

Now, Double-purpose Thermador Fan-Type Portable Electric Heaters are providing comfort and convenience in the Army, the Navy and war plants throughout the country.

When Victory is Won, Thermador Heaters will heat cool corners, cool warm areas, dry clothes and hair in the homes of America.

Aggressive dealers are featuring flameless, fumeless Thermador Heaters now to improve working conditions in war plants. Available on priority orders in portable or built-in types for use on 115-volt A. C. service, 1650 watts capacity —or 230-volt A. C. in capacities up to 5000 watts.

Thermador also manufactures built-in Electric Heaters, Electric Ranges, Electric Water Heaters, and Radio Transformers.

Write today for Catalog WS-6

THERMADOR ELECTRICAL MFG. CO.

5119 S. Riverside Drive, Los Angeles 22, Calif.

"Seven Leagues Ahead"

ILLINOIS

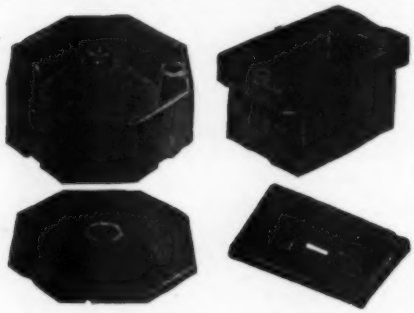
Completely Insulated

ALL PORCELAIN WIRING SYSTEMS

Save Critical Materials

Save Installation Time

Cut Maintenance



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Macomb, Illinois

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Combination mercury and incandescent lamp dome reflector is designed for use where illumination approaching daylight characteristics and intensity is desired on both flat and vertical surfaces. Lamp wattage is 250 watt mercury and 300 watt incandescent. Revere Electric Mfg. Co., Chicago, Ill.

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FLASHLIGHT

Plastic parts of this right angle two cell, pre-focused flashlight are molded of a thermoplastic material designed to stand up under temperatures ranging from 40° below to 175° above zero. The switch mechanism is constructed so that there is a positive "on" and "off". When switch button is set at half way notch, flashing button may be operated for fast or slow flashing. Gits Molding Corp., Chicago, Ill.

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Metal-saving fluorescent luminaire available for two 40-watt, three 40-watt, two 100-watt, four 100-watt lamps using special four-lamp ballast. Ballast is mounted on outside of pressed steel wire-way for cooler operation. Reflector may be easily removed without disturbing wiring. Commercial Metal Products Co., Chicago, Ill.

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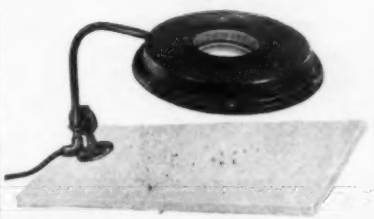
INSPECTION LIGHT



Dust-tight inspection light is essentially a magnifying lens with auxiliary lighting. It was designed for and is being used in ordnance plants where open-type units were not acceptable. Swivel base and movable arm permit adjustment of unit over the inspection plane for correct focusing on objects to be inspected. Curtis Lighting, Inc., Chicago, Ill.

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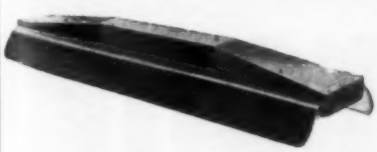
FLUORESCENT UNIT



Industrial fluorescent unit for standard 40-watt and 100-watt fluorescent lamps. Ballast utilizes a patented wiring circuit that starts lamps without use of starter switches. Available in sizes for 2-40 and 2-100 watt lamps, either 110-120 or 220-240 volts. Edwin F. Guth Co., St. Louis 3, Mo.

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ADVERTISERS' INDEX

A

Adam Electric Co., Frank..... 22
Appleton Electric Co..... 21
Arrow-Hart & Hegeman Elec. Co. 8
Atlantic Conduit Fittings Co..... 75

B

Benjamin Elec. Mfg. Co..... 15
Briegel Method Tool Co..... 74
Bright Light Reflector Co..... 67
Bull Dog Elec. Prod., Inc.. Inside Front Cover
Bussmann Mfg. Co.....Back Cover

C

Champion Lamp Works..... 35
Conduit Pipe Products..... 1
Crouse-Hinds Company 38
Curtis Lighting, Inc..... 24

D

Day Brite Lighting, Inc..... 26

F

Fleur-O-Lier Mfrs..... 28
Frink Corp. 10
Fullman Mfg. Co..... 69

G

General Electric Co. (Bridgeport). 46
General Electric Co. (Nela Park) 2, 3
Goodrich Elec. Co..... 68

H

Hazard Ins. Wire Works Div..... 11

I

Illinois Electric Porcelain Co..... 80
Ilsco Copper Tube & Products, Inc. 78
Insto-Gas Corp. 66

J

Jefferson Elec. Co..... 16

K

Klein & Sons, Mathias..... 70

L

Leader Elec. Mfg. Co..... 71
Lloyd Products Company 81

M

Minerallac Electric Co..... 78
Mitchell Mfg. Co..... 12

N

North American Lamp Co..... 82

O

Okonite Company 11

P

Paine Co., The..... 80
Pass & Seymour, Inc..... 76
Penn-Union Electric Corp..... 77
Plymouth Rubber Co. Inside Back Cover

Q

Quadrangle Mfg. Co..... 73

R

RLM Standards Inst., Inc..... 14
Royal Electric Co..... 78

S

Save Electric Co..... 77
Square D Company..... 4
Steber Mfg. Corp..... 72
Sylvania Elec. Prod., Inc..... 7

T

Thermador Electrical Mfg. Co... 79
Thomas & Betts Co..... 30
Thordarson Elec. Mfg. Co..... 81
Tork Clock Co..... 82
Trico Fuse Mfg. Co..... 82

U

Ultramar Mfg. Co..... 82
U. C. Lite Mfg. Co..... 74
U. S. Treasury Dept..... 50
United States Rubber Co..... 32

W

Ware Brothers 76
Webster Electric Co..... 48
Westinghouse Lamp Co.....18, 19
Wiremold Co. 6
Wolverine Tube Division..... 75

Z

Zenith Electric Co..... 80

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